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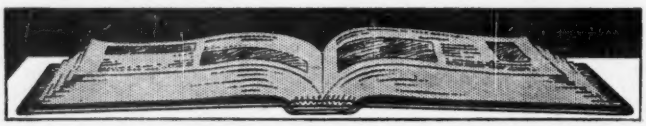

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Need a Lecture?

Three lectures are in the repertoire of J. Herbert Heger, 3939 Lowry Avenue, Cincinnati, Ohio. These are National Park lectures, one dealing with Great Smoky Mountains and Rocky Mountain National Parks, a second with Yellowstone and the Grand Tetons, the third with Yosemite, King's Canyon and Sequoia. All are illustrated with Kodacolor movies, and Mr. Heger also has Kodachrome slide lectures. Full details are available from him.

Wilderness Trail Trips

Announcement is made of the 1949 Wilderness Trail Trips in Glacier National Park conducted by H. Frank Evans. Quite a number of members of the American Nature Association have gone on these trips in the past and report glowingly of them. The itineraries take the wilderness hikers into the back country of this great National Park, over good trails to spots that few visitors to the park ever see. Full information about these trips may be obtained from H. Frank Evans, Panorama Ranch, Belton, Montana.

Two New Books

Announcement is made by J. W. Edwards, Ann Arbor, Michigan, of the publication of two important specialized texts. One of these is entitled *Studies in Freshwater Fishery Biology*, by Karl F. Lagler, 240 pages, illustrated, $4.00. The other is *Classification of Fishes both Recent and Fossil* by Leo S. Berg, 437 pages, $7.00. We have not received review copies of these so must be content with noting their availability.

Nest Wanted

Some time ago we carried a little note saying that Miss Minnie Gibbs, teacher at the California School, 1638 West Kentucky Street, Louisville, Kentucky, was seeking an oriole's nest for the classroom Nature museum. Our always helpful readers responded with eleven nests, which were shared with other grades and schools. Now Miss Gibbs is seeking a hummingbird nest—an abandoned one, of course—to add to the growing and interesting collection.

Fun with Nature

"Fun with Nature" is the title of a little pamphlet by Marie Barlow Buckman distributed by the Wisconsin Recreation Leaders Laboratory Association, 438 Lorch Street, Madison 5, Wisconsin, at twenty-five cents a copy. It suggests ways in which the title may be fulfilled through Nature games, clubs, music, literature, dramatics, Indian lore, art, handcraft, pioneering and woodcraft.

Nature in Print

WRITING NATURE LITERATURE FOR CHILDREN

By EDITH M. PATCH

OF THE various problems that confront all writers of juvenile books, perhaps these two trite questions are among the first to offer themselves: What subjects really interest children? What techniques of presentation serve best to keep the attention of young readers?

Involved and learned discussions of these and related questions may be heard at certain pedagogical conventions, and read in subsequent reports. And yet, in spite of the impressive vocabulary employed in such discussions and reports, I doubt if there is a better source of information than that given, quite simply, by the children themselves. By way of example:

> *"Daddy, is what you are going to read true, or is it only nonsense?"*

"That is the question that Dorothea asks me every time I begin to read to her," the little girl's father remarked to me, years ago. "She enjoys, evidently with equal zest, material that falls into either of her two categories—truth or nonsense; but she wishes to have her perspective properly adjusted at the beginning. She feels cheated, for instance, if she listens to an account of what she assumes to be an actual event only to discover, as the reading proceeds, that she has mistaken fancy or fiction for fact. Similarly, if she does not recognize real information at its true value, she regrets this experience, too."

It was in 1909 that Dorothea was requesting her father to inform her in regard to the factual status of what she was about to hear, in order that she might be prepared appropriately to appreciate the selection provided for her entertainment. It seems rather a logical sequel that twenty years later she attained the degree of "Doctor of Philosophy" at Clark University, and subsequently assumed the role of Associate Professor of Psychology at Skidmore College.

A university professor would use a phraseology different from that of childhood days in classifying the same reading matter, but perhaps even the most scholarly attempt would not result in a more descriptive contrast. For do not those who write for children attempt to give their readers—(1) actual information designed to satisfy and stimulate the normal curiosity with which children view the objects surrounding them; or (2) fiction of some sort, intended primarily to appeal to the also normal imagination of their young audience?

Obviously the fault in this distinction, as with most classifications, is that it is too clear-cut, since there are frequent overlappings. The authors of fairy stories, adventure stories, and material falling into other groups of fiction usually include certain factual features. And some writers of informational material blend fiction and imagination with their facts.

Fortunately, this article need not become involved in so broad a range for, as its title indicates, it is concerned only with the field of Nature-writing-for-children.

There is, perhaps, no normal child whose natural curiosity cannot be focused upon any animal or plant, if he is given well-selected and understandable information about it; and if the information is presented to him in an entertaining manner. Persons, then, writing Nature literature for children have a large potential audience. And when an interest in Nature is really aroused, it usually lasts and thus guarantees added pleasure during later years.

A writer of Nature books for children, indeed, may approach such a venture with the thought that he is performing a dual function; for the delight, which he attempts to share with his readers while they are young, may linger with them until they are old. If such a perspective of his program deepens the author's feeling of responsibility, no harm is done; for has not his project several aspects that merit serious consideration?

To begin with, he should make every effort to tell the truth, both for his own self-respect and for the sake of his readers. And to present an accurate account of even very familiar subjects is not so simple a matter as it might seem.

"He tucked his head under his wing and went to sleep," an author may relate, in a traditional manner, without even pausing to consider whether the mental picture resulting from this statement is in accordance with the actual position of the head of a sleeping bird.

Or, if a tradition has been given enough adverse publicity, it is easy to swing too far in an opposite direction. For example, today anyone would avoid stating that a porcupine "*shoots* his quills" in a deliberate attempt to defend himself. Indeed, the reaction to such a theory has been so strong during recent years that many writers have been saying that porcupines cannot even *throw* their quills. And yet a naturalist who is really well acquainted with these spiny creatures was kind enough to write me that a porcupine "can and does throw his quills, with his tail. New quills are always growing, old quills loosening, so that he is 'shedding' most of the time. When he strikes with his tail, the motion is quick and strong, and it drives quills into any soft object it hits. It it hits nothing but air, some of the loose quills fly off—not at every stroke of the tail, but often enough to be noticeable if you are looking for it."

Miss Edith M. Patch was elected an honorary life member of the American Nature Study Society at its annual meeting in December, 1948, in recognition of her outstanding contribution to Nature education as teacher and writer. The accompanying paper was presented at the ANSS session devoted to children's Nature literature, and is used here, and on the page shared by the ANSS and the National Association of Biology Teachers, at Mr. Zahniser's suggestion.

Of course this naturalist does not think that the porcupine has any definite notion or intent of "throwing" his quills. He just hits out with his tail—and the result is merely a matter of the natural physics of such a motion.

Again, it has been an almost traditional mistake to use the Eskimo word *igloo* as if it were synonymous only with *snowhouse;* although as a careful and informed author, Dr. P. A. Knowlton, explains to his young readers: "In the Eskimo language, *igloo* means a building; and since the buildings of the Eskimos are almost always their homes, *igloo* usually means house." And Vilhjalmur Stefansson (who should know!) has declared in letters to authors and editors that all Eskimo dwellings, whether built of snow or sod or whatnot, are *igloos.*

The ease with which a writer may pass on bits of misinformation, even in regard to subjects as common as the examples just mentioned, stresses the need for constant caution. Indeed, can one really feel safe unless he reviews every statement he makes, checking it to be sure that (1) it is based on his own personal observation (with notes taken at the time to safeguard his memory), or that (2) he has some other entirely authentic source of information? In regard to any disputed item it gives the author a comfortable feeling to know that he has on file, as background data, a letter from the best authority on the subject.

The author's responsibility is not limited to facts of the text and the manner of their presentation; for unless he is also an artist, illustrating his own book, he has a problem to meet in securing drawings that are in accordance with the text, or that

give additional details desired to supplement the text. Happily, it is sometimes possible to secure the collaboration of an artist who is as well acquainted with the subject as is the author, and who has access to all the necessary material.

Frequently, however, the most skillful artist may not be familiar with, or have access to, the subject needed for a certain chapter. Then it is not feasible merely to say, "Please make sketches of wood lily, *Lilium philadelphicum L.*: one of blossoms for full page in color, one ink sketch of bulb to reduce to 2 by 4 inches, and one of seed pods to reduce to 3 by 4 inches." Instead, the author may need to go forth and gather said blossoms, bulb, and seed pods, pack them so that they will reach the artist in perfect condition and express or mail them without delay.

A live snail, found in a swamp at four o'clock in the morning after ten or twelve unsuccessful quests at other hours of the day and night; a robin's nest waited for until the young have departed; milkweed stalks with opening seed pods; twigs of balsam fir with cones at different stages of development; photographs of bank swallows' habitat; live crickets, young and old—jaunting here and there to secure these, and perhaps forty other subjects, and sending them undamaged to the artist at the proper moment, all this may take nearly as much time as the actual writing of the book itself.

Even after the artist's labor is over and the satisfactory illustrations are in the hands of the publisher, there is still a possibility of a humorous, if exasperating, sequel. For instance, there may be a sketch of an insect that, when feeding, always stands clinging to the stem with its head pointed downward. Both artist and editor have been assured as to the correct position. The printer, undisturbed, sends out proof with the insect still head-down. And then, at the last moment, the printer gazes critically at the cut. "Can't be," he mutters, "head down, tail up. Queer none of the proof-readers noticed that!" With a gesture toward what he feels certain is for the good of all concerned, the printer assumes an initiative and responsibility he very, very rarely takes, and the first edition of the book appears with the cut reversed and the insect is standing in what looks to be a comfortable upside-up position instead of being properly upside-down.

Of course the sympathetic editor agrees with the author that this mistake must be corrected in the second printing of the book, and the publisher sponsors this plan for reliability in future editions. But, alas, the first edition is already on the market.

There being many stumbling blocks and pitfalls in the progress of assembling and presenting even the simplest little items of truth, it is comforting to realize that there need be no attempt to tell the *whole truth* (which perhaps no one knows); for it is sufficient to select only those most significant and most easily understandable features of an animal's habits, habitats, and so on—those that will claim the interest of children.

The real problem comes with the important consideration: Shall *nothing but the truth* be told? That is, how much, if any, fiction is it desirable and justifiable to introduce?

Action, most will agree, is necessary; for it would be dull material without plenty of happenings, and what animal leads an uneventful life? Some narrative technique, then, may be the easiest form to use to get the desired results.

Thus a common black bear, as the chief character of the narrative, may be shown experiencing such events as are known to be consistent with those experienced by an animal of his species, both in relation to his family life and to outside contacts appropriate to his natural environment. For the convenience of both writer and reader, the bear may be given a story-name. "Woof," however, is not endowed with the power of human speech. Nor is he allowed to regard his own activities, or any of his experiences, from a perspective that would be possible only to human beings. He is, indeed, "just a bear," living and behaving as a bear really does.

Such a presentation is in accordance with the work of those Nature writers who are unwilling to have their story-animals talk after the manner of mankind, expressing ideas that would be possible only from a background of human knowledge. There are several reasons for this objection; among them the belief that a conversational bear, for example, confuses the impression made on the child who reads the story. The youngster knows that the bear cannot talk. In evaluating this feature as "make-believe," will he assume that the other features are also fanciful?

Those writers, just indicated, have the sympathetic support of certain critics and editors who share these adverse reactions to Nature-story animals fabulous in having the speech and philosophy proper only to *Homo sapiens*. One of these editors, under whose direction a Nature story has undergone an "adaptation" for younger readers, recently wrote the author of the story (who had objected to one paragraph in the submitted manuscript of the adaptation because it had been changed to imply that young squirrels fully realized and appreciated the wintertime significance of the autumn food-gathering habits of their father) as follows:

"I am indeed sorry to see that the idea of motivation and appreciation slipped into the story, and that the manuscript was sent you before I saw it. At the time that I read the adaptation, I was a little shocked myself, because I have lectured

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IN THIS ISSUE

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NATURE IN PRINT

(Continued from page 155)

to all my assistants so thoroughly on the subject of giving such ability to animals whose mental powers they do not know. The corrections have now been made. I assure you that errors of this type will not be made again."

However, not all naturalists agree that folk-like conversation among animals is an error in Nature-story technique. Some believe that such speech is desirable as an aid in introducing the really factual material in a sufficiently entertaining manner. The ornithologist, Dr. Arthur A. Allen, states in the introduction to *American Bird Biographies:*

"In this little book of bird biographies I have attempted to do this—to let each bird tell its own life story as a real neighbor might, in the hope that it may elicit interest in its welfare and provide a new outlook for the Nature-lover who is ready to progress beyond the naming or cataloging stage of his bird-study."

And Thornton W. Burgess in the preface to *The Burgess Bird Book for Children*, a book in which the characters talk with one another, says:

". . . Because there is no method of approach to the child mind equal to the story, this method of conveying information has been adopted. . . . In its preparation an earnest effort has been made to present as far as possible the important facts regarding the appearance, habits and characteristics of our feathered neighbors. It is intended to be at once a story book and an authoritative handbook. . . . It is offered to the reader without apologies of any sort. It was written as a labor of love—love for little children and love for the birds."

Each of these two authors indicates that he has most earnestly undertaken his task with two objectives—his book is written for the sake of *children* and for the sake of *birds*. That is, he hopes that our bird "neighbors" will benefit because of the deeper interest stimulated in their behalf by his stories.

This is the attitude one would expect in a Fellow of the American Ornithologists' Union, Arthur A. Allen; or in an Honorary Vice-President of the Massachusetts Audubon Society, Thornton W. Burgess. Indeed, why would any naturalist allow himself to neglect the opportunity he has to serve the cause of conservation of our bird and other animal neighbors while he is bringing them to the attention of young people?

With this in mind, the animal characters in children's books should be dealt with fairly. A raccoon is no more to be viewed as a villain while catching a fish, or enjoying a mouse or young bird for his dinner, than is a man while fishing for trout, or feasting on roast lamb or stuffed turkey. Both raccoon and man are naturally omnivorous creatures and take their meat as well as vegetables and fruit. Should not the habits of raccoons or other meat-eaters, whether furred or feathered, be treated with as much tolerance in this respect as we treat our fellow-guests at a Thanksgiving or Christmas dinner?

Yet too many "Nature writers" seem to find nothing of much interest to record except the terror of a chase—the chaser being featured as a fiendish murderer and the chased one as experiencing almost continuously a life of fear. Is this a fair or wholesome view of the actual facts? I have previously expressed to young people my own opinion in *Safety First Among Animals*, as follows:

"It is quite true that animals of most kinds are in frequent danger of being caught. But these periods of danger are brief, and the animals have the rest of their time for such activities as attract them.

". . . A snail withdraws into its shell and thus avoids being touched on the soft parts of its body, but it is not able to do any worrying or thinking on the subject. If a hawk flies over a group of trees, it is quite possible that the perching birds in the trees may experience a few minutes of fear. If they notice the hawk, as they are likely to do, they stop singing and moving about until the bird of prey has gone. But this silent period is a short one, and almost at once the birds are singing again as cheerfully as before. Of course many animals, in spite of their natural protections, are caught and killed for food by other animals; but even when they come to such an end, the experience of being caught and killed is a brief one. They have had their days or weeks or months or years of normal living before this happens to them. If you see an automobile coming in your direction, you get out of its way. Your legs give you a natural means of escape from danger. Then you proceed cheerfully about your affairs. Certainly you do not spend your days worrying about all the automobiles that have never hit you. There seems to be no reason to think that any wild animal, although it has its moments of danger, lives a life of fear or discomfort."

If those who are about to record the activities of certain animals chiefly in over-stressed fright and gore would lay aside their angle of approach long enough to read Dr. William J. Long's *Wood-Folk Comedies*, prelude and all, they would at least become aware that there are perspectives quite different from their own. They might, fortunately for children, even refrain from writing at all—until they have wandered into the woods again and found something pleasant to relate.

Anyone who can recall the days of his own childhood, or anyone who actually knows children, realizes that boys and girls, if they have the opportunity, are at least as keenly interested in Nature as are older persons. The naturalist, then, who addresses children, can speak of the same general matters—appearance, habits, environments, and so on—that he would discuss in popular writing for older readers. He takes care, of course, that the words he uses are understandable, but he need not "talk down" to youngsters. They have an essential dignity that should be respected. They seek knowledge of plant and animal life as earnestly in youth as in later years, and welcome help from the books that serve their needs.

An author achieves by conscious effort (or haphazardly stumbles into) his own manner of writing. His technique may not be as distinctive as he might wish, since not every one is gifted with originality. For instance, it takes a liking for physics, a flair for comparisons, drollery, and an ability to draw to produce Nature books so different from the general run as are those by Wilfrid S. Bronson. Could anyone do a better job than he in making a child understand how a penguin "rows" *(Paddlewings)* or how an ant uses its "comb" *(The Wonder World of Ants)* and so on?

With the various feasible methods of presenting Nature material; with the multitude of available subjects awaiting attention; with perhaps every normal child ready to become interested in Nature—a wide field is open to any qualified author.

And who is qualified? Perhaps any lover of Nature who has a real knowledge of what he is talking about and also has a sympathetic understanding of the children to whom he talks. Perhaps any such writer might meet the requirements of the youthful psychologists who wish the distinction made as to whether a book is "true or only nonsense."

★

Festival at Night

By OSCAR OSTLUND

Nimble-footed shadows walk across the fen,
As Night—with something wonderful to celebrate,
Signals to inaugurate
The festival. Lamp after lamp is lighted up in Heaven.

License Figures

Hunting licenses for the fiscal year ending June 30, 1948, were down from the previous year's figure, while fishing licenses showed a marked increase, reports Albert M. Day, Director of the U. S. Fish and Wildlife Service. Hunting licenses fell off from 12,066,763, a record high, to 11,391,810, while fishing licenses jumped to a new high of 14,582,739, from 12,620,464. Decline in hunting licenses was caused, in part, by specific situations, such as restriction of out-of-state licenses in South Dakota, the fire hazard in Maine causing a ban on hunting, and a sharp drop in non-resident licenses in Colorado. The first ten States in number of hunting licenses were, in order, Pennsylvania, Michigan, New York, Ohio, California, Illinois, Indiana, Washington, Wisconsin and Colorado.

The Follett Award

Writers of children's Nature books should be interested in the Charles W. Follett Award of three thousand dollars for worthy contributions to children's literature. The purpose of the award is to stimulate more interest in literature for children among established authors, and to discover new writers. A high literary standard is set, as well as requirement that books be significant. The award is annual and opens on January 1 of each year, closing September 1. Full details may be obtained from The Charles W. Follett Award, 1255 South Wabash Avenue, Chicago 5, Illinois.

Fernglen Workshop

Word comes from Mabel Turner of Antrim, New Hampshire, that sessions of The Fernglen Workshop of Biology and Nature Study will be held again this summer. These sessions provide field courses in Nature education, gardening and conservation for camp counselors, teachers, garden club members and others interested in the outdoors. Full information may be obtained from Mabel E. Turner, Professor of Biology and Nature Education, State Teachers College, Lowell, Massachusetts.

Conservation Sources

A committee of the National Committee on Policies in Conservation Education was named in 1947 to select bibliographies on conservation for pupils and teachers. A short list of the more useful references has now been compiled. This list is not regarded as ideal, either in scope or detail, but it is felt to be a beginning, and criticism and suggestion are welcomed. Copies of the list may be obtained for two cents each, to cover postage, from John W. Scott, 1409 Garfield Street, Laramie, Wyoming.

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

EDIBLE WEEDS AND SCHOOL

SCHOOL programs, from one end of the land to the other, are full of recommendations that children learn how folks of other times and places live and lived. For some unexplained reason, we begin with the igloos of the Eskimos of the far off Arctic. We study how our "little brothers" of the great desert places live, and how other human beings manage to survive in all sorts of conditions.

I am willing to wager that a majority of the stimuli for learning in this field are to be found in books, and that, when the youngsters are through with the units, they may think that they know how Indians, or Eskimos, or Japanese live, but they do not know the possibilities offered for living by their own front yards. Frankly, I question the effectiveness of learning through vicarious experience as compared with the possibilities of learning through immediate reality. I also question the value of what may be attained through the orthodox procedure, as against the returns that may come through learning from the outdoors. Of course, the reason why we do what we do is that we have been taught to do what we do. We learned, in our period of training, this and that thing, and so that is what we will ourselves teach. We may have had years and years of formal education, and almost no opportunity or guidance in learning from things that are immediate.

This morning a woman came into my office asking for help. She was a graduate of a teachers college and held a Master's degree in English. She had had no background in science at any time. She had just been appointed to supervise elementary science for some 400 youngsters in a Long Island community, and she wanted me to tell her how to make good on her job in a few minutes. She said that the superintendent particularly wanted her to emphasize the study of plants and animals, and might want her to give them a little help on radio and television. Now what possibly could be done in a situation such as that?

I rather think that one avenue of learning is through the senses centered in our mouths. Children begin exploring with their mouths more quickly than with any other part of their bodies. Most youngsters continue to depend considerably on what their mouths tell them, and so anything that can use that natural avenue for learning may well be enlisted. The possibilities are infinite.

A child may see something that is red, and, possibly, taste it. The initial experience may be pleasing, so much so that, if the next experience in tasting something that is red is also pleasing, he may become convinced that he can depend on color to tell him something about the taste of an object. If, at this point, he has an experience with a red object that does not taste well, he must qualify the temporary conclusion he reached. If the experiences supplied him by opportunity, chance, or a teacher are sufficiently varied, he may come to the conclusion that red, or any other color, for that matter, cannot be accepted as a valid basis for judging the taste of an object. The possibilities of experiencing various combinations of color, shape, or apparent juiciness lend themselves beautifully to planned activities that may help make a rational human being. This should, of course, include not only the creation of habits that make one avoid some possible unpleasant experiences, but it must also avoid destroying the investigative instinct, which may well lead to some rich living experiences.

I am sure, from experiences I have had with students, that surprisingly few are able to recognize such a common, ubiquitous and pleasing plant as spearmint when they see it. I am sure that the teacher who came to see me this morning could not do it. I am equally certain that few ever tasted the young shoots of milkweed, providing they could even recognize a young shoot. Fewer yet could know a Jerusalem artichoke when it is in its most delicious condition. Teachers with little or no experience in tasting things in the outdoors will have natural reservations about going out and tasting everything. They should have those reservations, but they have no right to surround themselves and their pupils so completely with reservations that they pass up the fun of nibbling a sweet clover seed and waiting for the delicious aroma to come up through their noses. They have no right to deny their pupils the genuine fun that goes with nibbling sassafras, black birch, wintergreen, spearmint, peppermint, touch-me-not seeds, and a thousand other things. I venture to say that, if we set ourselves the task of teaching people how they may live happily in the environment in which chance placed them, there is some obligation on the teacher's part to make some effort to acquaint those pupils with the possibilities of local surroundings. I know of no better way than to begin with a few common, perfectly safe things such as are suggested in my article, "Edible Weeds," in this issue of *Nature Magazine*. Go out on the lawn, the next chance you have, and nibble a bit of sourgrass, or try mixing it with some chickweed to see how you can get a wild salad that suits your taste.

Obviously it is impossible here to give a complete course in the edible wilderness any more than I could solve my morning visitor's problem in the time she allowed me. You can, however, make a start, as did she. Once you get started I am sure you will enjoy continuing to learn this way. It will be novel for many trained in the orthodox way, but that should make it even more intriguing.

There is a considerable literature in this field that might be of interest. Some of these books may be in your library, and if you enthuse to the study, and want more help, all you have to do is drop me a line and let me help you further.

Among the better common books on this subject I would suggest the following:

Edible Wild Plants. By Oliver Perry Medsger. The Macmillan Company, New York City. 1939. 323 pages; *Camping and Woodcraft.* By Horace Kephart. The Macmillan Company, New York City. 1927. 884 pages; *Edible Wild Plants of Eastern North America.* By Merritt Lyndon Fernald and Alfred Charles Kinsey. Idlewild Press, Cornwall on Hudson, New York. 1943. 452 pages; *The Outdoorsman's Cookbook.* By Arthur H. Carhart. The Macmillan Company, New York City. 1944. 211 pages; *Common Edible Mushrooms.* By Clyde M. Christensen. University of Minnesota Press, Minneapolis, Minnesota. 1943. 124 pages; *Camp Grub.* By Elon Jessup. E. P. Dutton and Company, New York City. 1924. 274 pages; *Outdoor Cooking.* By The Browns, Cora, Rose and Bob. The Greystone Press, New York City. 1940. 506 pages; *Scout Fieldbook.* By James E. West and William Hillcourt. Boy Scouts of America, 2 Park Avenue, New York City. 1945. 540 pages; *The Fieldbook of Natural History.* By E. Laurence Palmer. McGraw-Hill Book Company, 330 West 42nd Street, New York City. 1949. 663 pages; *Come and Get It.* By George W. Martin. A. S. Barnes and Company, New York City. 1942. 190 pages; *Camp Cookery Hints for Leaders.* By Agatha Deming. Slingerland-Comstock Company, Ithaca, New York. 1925. 30 pages; *Wild Foods.* By Eva Gordon. Cornell Rural School Leaflet. Ithaca, New York. 1943. 32 pages.

We have not tried to give the prices of these books because, often, the original published prices have increased. However, many of them will be found in the public library, and, should you wish to purchase one or more, your librarian should be able to help you.

Contents Noted

RECENTLY a great horned owl, blinded by an outdoor light installation, struck a conduit connected with the fixture with such force that the bird crushed its chest and died. This was in Santa Cruz, California, and the *Santa Cruz Sentinel* carried a story and picture of the bird. Neither event is remarkable, but what was unusual was the positive character of the newspaper's "obituary" of the owl. Usually such stories describe such birds—hawks or owls—as powerful and vicious predators. Not so in this case. The newspaper turned to Clark P. Streator, well-known naturalist, for information, and took pains to point out that the great horned owl is valuable to humans, its diet of insects and destructive rodents far outweighing an occasional chicken taken when hunger dictates. Furthermore, the owl had a large rat clutched in its talons when it died. Also the newspaper story carried a good thumbnail life history of the bird, and we take off our hat to the editor of the *Santa Cruz Sentinel* for a constructive job of ornithological reporting.

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DISTURBING word comes from Alaska that the Territorial Legislature has been memoralized to remove the protection afforded the Alaska brown bear and the sea lion, on the ground that both mammals are a menace to the salmon supply. The contention is made that both animals make great inroads into the numbers of the salmon before the fishes reach the spawning ground. Once again misinformation and uninformed prejudices are being marshalled against wildlife species. Actually, the preponderance of evidence is that the bears eat salmon that have already spawned and are in a helpless or dying condition. And such studies of sea lion stomach contents as have been made show that these marine mammals live on squids, octopuses and trash or predatory fishes. Indeed, there is every indication that the sea lion is a valuable scavanger of the waters. Old wives' tales similar to those used in Alaska to condemn the world's greatest carnivore and the sleek sea lion were invoked against the bald eagle, which long had a bounty upon its head in the Territory. It is hoped that biological fact will prevail over falsity, and that bear and sea lion not only will not be deprived of protection, but will be more zealously protected.

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LIFE promises to be tough for quails in Florida, whatever the locality they may chance to roam. The State Game and Fresh Water Fish Commission has thought up a new plan for restocking shooting areas with the birds. A systematic trapping of bobwhites in the vicinity of cities and towns, and in citrus groves, will be carried on, and the trapped birds will be transferred to areas where they can be shot at. Biologists of the Commission estimate that one hundred thousand birds can be trapped in areas where hunting is not now possible. Under the plan the landowner on whose property the bobwhites are trapped will be paid fifty cents per bird captured.

Quail restocking in Florida formerly was done with birds imported from Mexico, but our neighbor to the south has placed an embargo on exportation of the birds. It may be that this restocking plan will be generally accepted by Floridians. However, we imagine that there are many who, living in relatively urban areas, find pleasure in hearing the call of bobwhite, and in observing and feeding the birds. We believe that there are many who will place a higher price than fifty cents on this pleasure, and will prefer to have the birds around. We wonder, also, how much this payment, plus the cost of traps and personnel to do the trapping, will add up to? Certainly it will make a few ounces of quail pretty costly.

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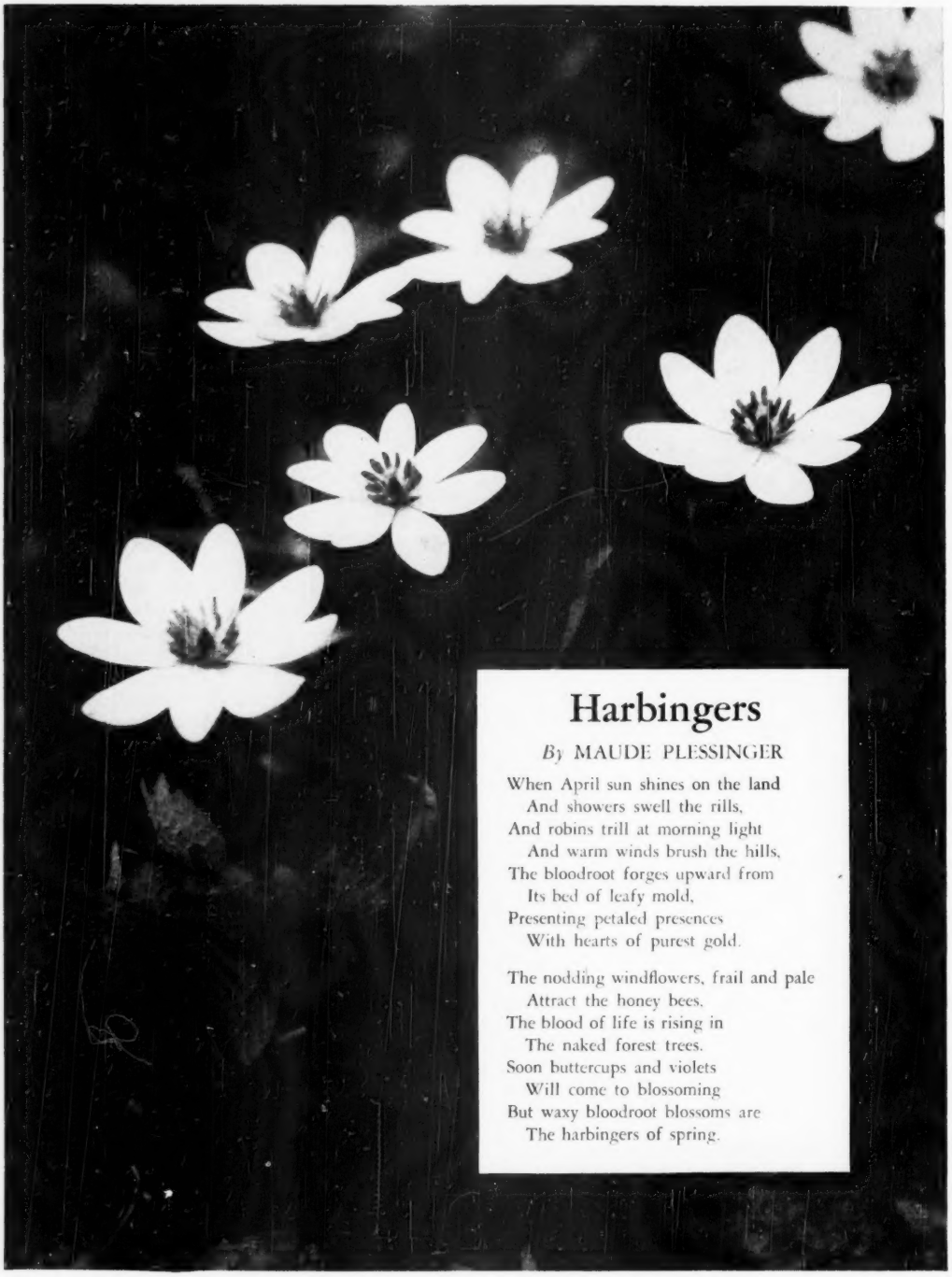
"IN the season just closed here in Maine we experienced by far the worst poaching situation in the history of the state, despite the desperate efforts of our highly efficient, but under-manned, warden force to combat it." This is the statement of Earle Doucette, director of publicity for the Maine Development Commission. He has been in the outdoor field for many years and knows intimately what goes on. He is amazed at the apathy, "even amusement," of a great portion of the public, but feels that "this public indifference is not an indictment of the man in the street but an indictment of all of us who have been banging out outdoor stuff over the years."

"Somehow," Mr. Doucette continues, "we have become intrigued with the belief that anyone who carries a gun or rod is a 'sportsman,' though I have failed to find anyone who can define that term, and we think that whatever he does is unquestionable. I have seen a great many hunters and fishermen over the years and I think the skunk content among them is fully as high as in any other sport or endeavor. Let's stop kidding ourselves. The fellow who carries a gun or rod is a 'sportsman' only after he proves to be one and not by divine right. In other words, it is about time we started cleaning house."

Mr. Doucette issues a call for rod and gun, and outdoor writers to call "a skunk a skunk." (We hope he apologized to the skunk.) He points out that writers in all other fields of sport "call their shots as they see them."

We are heartened to see this fighting attitude among an increasing number of outdoor writers. We quoted two other fine statements on this page of our March issue. Indeed, we are relieved to be able to quote men within the ranks of the sporting fraternity in such terms, and we are at their service in helping them to "clean house." We have been urging such tidying-up for some time. R. W. W.



Harbingers

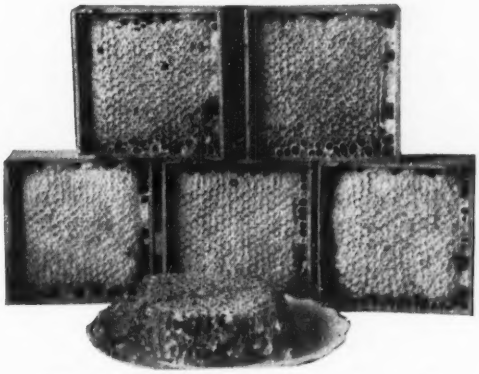
By MAUDE PLESSINGER

When April sun shines on the land
  And showers swell the rills,
And robins trill at morning light
  And warm winds brush the hills,
The bloodroot forges upward from
  Its bed of leafy mold,
Presenting petaled presences
  With hearts of purest gold.

The nodding windflowers, frail and pale
  Attract the honey bees,
The blood of life is rising in
  The naked forest trees.
Soon buttercups and violets
  Will come to blossoming
But waxy bloodroot blossoms are
  The harbingers of spring.

Honey—
Golden Wonder

By DONALD CULROSS PEATTIE

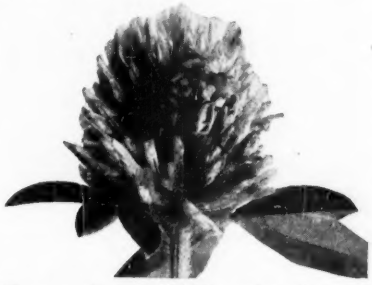


"Honey is the purest of all foods . . ."

SOME fifteen thousand years ago an artist drew on the walls of a cave in Spain a picture of his Stone Age neighbor robbing a bees' nest of its golden store. In the millennia that have since gone by, we have invented wonderful and fearful things; but no one has ever invented or discovered a purer and sweeter food than honey.

Because of its chief ingredient—levulose or "fruit sugar"—honey is almost twice as sweet as cane sugar. And what table sugar glows with the sunlight of summers past, contentedly imprisoned there? Or breathes the fragrance of clover, acacia, basswood, or orange blossom? Table sugar, like salt, has but one taste. Every honey has its own; bees work upon 2000 species of nectar-bearing plants, in this country. It would take an epicure's lifetime to discover, sample, and enjoy all the possible vintages that bees distill.

Honey is the purest of all foods because its concentration of sugars is so high that, even when exposed to contamination, bacteria cannot live more than an hour or two in properly ripened honey. In a royal Egyptian tomb was found honey 3300 years old—darkened and thickened by time, but pure honey still. No knavery can corrupt honey without detection. If diluted with water, it ferments. If adulterated with corn syrup, it separates out. There is today nothing but pure honey on the market, since no one yet has found a way to cheapen or to improve this product of Nature's sunny hours.



"Bees work upon 2000 species of nectar-bearing plants, in this country."

No wonder that the purity and sweetness of honey have entered symbolically into wedding ceremonies, from Egyptian times to the present. Drops of honey were placed upon the newwed Roman couple's threshold—that is why the bride was carried over it. From Hungary to Hindustan, honey—baked in the cakes, drunk in the wine, used in intimate rite or public act—is part of the marriage sacrament, and the first bliss is called the honeymoon in more tongues than ours.

Yet this ancient and natural food is mysterious still. It is one of the wonders of the world, the product of an intricate relation between bees—the high peak of insect evolution—and flowers—the loveliest part of the green world. Nature has adapted the forms of flowers to entice bees, and the bodies of bees to fit and pollinate the flowers, and to use their pollen and nectar. This parallel and sympathetic evolution has gone on until 10,000 species of flowers would be extinct but for the bees, and bees could not live without the flowers.

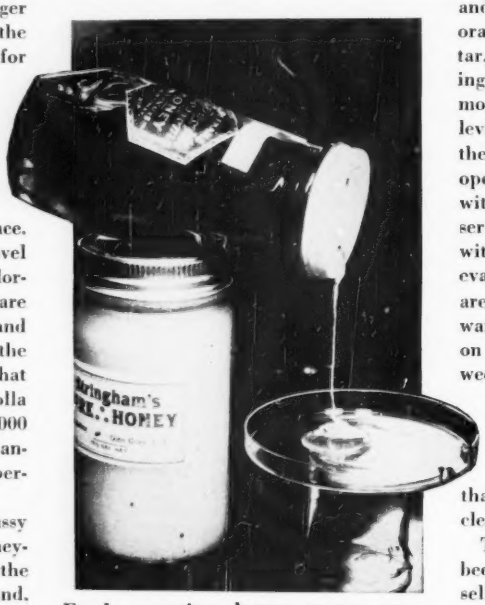
When I go out into my garden at the height of a warm, moist day, the flow of nectar at the base of the petals in my orange blossoms is at its maximum. If I shake the blossoms, I can sometimes see the nectar washing about within them like clear water in a little bowl; drops of it fall on my hand as from a perfume bottle. The air is filled with the fragrance, but although I can smell it from only a short distance, it has brought the bees from afar. There is a joyous uproar all over the tree, as they embrace the flowers and revel in the sweets. Each has, perhaps, 500 times her own weight in nectar to carry back to the hive before darkness. And since workers from a single hive may visit more than a quarter of a million blooms a day, their arrivals and departures constantly fill the air with golden bee-lines into the blue.

This fleck of nectar on my hand, that to me is just a sweetish, watery drop, is an ocean for holding minerals, enzymes, and foods. It contains traces of iron, copper, manganese, potassium, sodium, phosphorus, proteins, and vitamins. Its fragrance, and that of the honey that could be made from it, is due to the specific esters, aldehydes, and terpenes in orange blossoms, and to those higher alcohols, mannitol and dulcitol. The bee does not have to know such organic chemistry, and you and I do not have to remember it, but those who have delved in the subject can explain why many diabetics can tolerate honey, where table sugar is deadly, and why it helps

babies to retain calcium, and so grow stronger limbs and better teeth. Unsurpassed as a carbohydrate food, honey is rated not as a luxury but high on the list of essentials by the experts: we sent 12,000,000 pounds of it to Europe under the interim aid bill, and we are sending more under the Marshall plan.

Honey is the fuel burned by that tireless motor, the bee. Her blood sugar content is twenty times that of a human, and it needs to be, since, for every pound of honey produced, three times as much nectar must be gathered and brought home. As a bee can carry just so much (or so little!), it has been calculated that a pound of honey requires 37,000 bee trips to the flowers and back!

Much of a bee's adult life is a training for nectar-gathering, and, like all flyers, she begins with practice flights, each one a little longer than the last. She learns the landmarks around the hive, for she may have to travel as much as eight miles to some orchard or alfalfa field. If we could feel all a bee feels on her missions, the world would be an exciting and unrecognizable place. Bees have no ears, so they travel through silence. Although color-blind to red and green, they are keenly responsive to blue and purple, and since they see the ultraviolet hues we cannot, what radiance must lie in the corolla of some blossoms! And 2000 olfactory plates on the bee's antennae give her a range of perfumes beyond our dreams.



Fresh, genuine honey pours very slowly through a nail hole in the jar cover, making snaky coils in the dish below. Diluted honey will not do so.

The first dandelions and pussy willows of spring have honeybees at them weeks before the lazy bumblebee is abroad; and, long after he has dropped dead of frost bite, the lingering asters and goldenrods show a half-numbed honeybee still extracting what she can. In between those seasons she is still the most faithful and provident of the flowers' lovers. A bumblebee, a butterfly, a hummingbird flits from blossom to blossom, mixing every sort of pollen. Only the honeybee is loyal to one sort of flower at a time—the one with the greatest flow of nectar. So she brings to each bloom none but its specific pollen, and she makes but one kind of honey at a time. That is why the beekeeper can sell you pure buckwheat, or pure mesquite honey, although he may choose to blend fine flavors

From sun-up to sundown, from spring to fall, the bees thread the air unceasingly. At the height of the nectar flow, in late spring and early summer, they literally kill themselves with work. It is the destiny of every good worker to die flying, struggling to bring back one last load to the hive. Within two to six weeks of peak exertion, she drops unnoticed in some field or lake. But her place is taken at once by another young bee on her first nectar flight. Each bee is but a unit in the unceasing airlift that may fly 17,000,000 miles a year to supply a single bee city with food. For it takes about 480 pounds of honey just to keep one hive alive.

Even the entomologists are not sure just how nectar becomes honey. The great beekeepers who have watched most closely tell us that in the hive the field bees pump up the little cargo of nectar from a special crop into the mouths of the young stay-at-home bees. These are then seen thrusting their tongues in and out; they seem to be evaporating the water from the nectar, and probably they are adding enzymes that convert almost all the sugars in it into levulose and dextrose. Then these young worker bees fill the open cells of a new bit of comb with their product. Some observers say they fan these cells with their wings, to increase evaporation. Even after the cells are sealed over with a cap of wax, the enzymes go on working on the sugars. So, after a few weeks, the "green" honey becomes ripe honey, and the apiarist lifts it out, to sell in the comb or, extracted by centrifugal force, as that essence of a June day—clear honey.

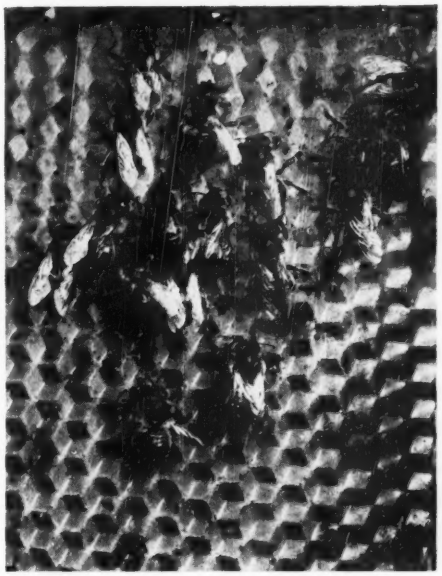
There are more than a million beekeepers in this country. They sell 200,000,000 pounds of honey a year, although they claim that their bees, through their pollinating activities, give to agriculture thirty times the value the honey brings. In California, which produces more honey and more kinds of honey, and consumes more honey, than any other state, 800,000 acres of the most valuable crops in the world, principally citrus, are absolutely dependent upon the highly organized workers of the hive.

Only certain plants with truly exquisite nectars produce a honey you would want to eat. But many other flowers yield quantities of nectar from which are made dark-colored, rank-flavored honeys, of which bakers and confectioners take immense quantities; when cooked, such honeys lose their bad flavors without parting with any of their sweetness or food value, or with the power to keep baked goods moist. Tobacco

companies buy millions of pounds of low-grade honey a year for preserving, flavoring, moistening, and mellowing tobacco. Such honeys also go into hand lotions, cough medicines—and golf balls!

In contrast with the great bulk and the low grade of industrial honey, the table varieties are the jewel trade of this fascinating business. Fine honeys are precisely graded, sixty points for taste, twenty for color, and ten each for aroma and consistency. They must be truthfully named; for thousands of years connoisseurs have been buying their honey with discrimination. The ancient Athenians got their most delicate honey from Mt. Hymettus. The secret of Hymettus honey is the nectar in the little wildflower called thyme. The secret of Malta's honey, famous through the Middle Ages, is the orange blossom; of the celebrated honey of Gatinais in southern France, sainfoin. The wood honey of the Black Forest is made by the bees from the gummy drippings of pine needles. In this country sixty per cent of all honey is white clover, and who cannot taste, in a drop of it upon the tongue, past summer happiness—blue sky, warm wind, bright sun?

Each part of our country produces a honey, or several kinds, that holds in its amber the spirit of the place. Did you have a childhood between the Missouri and the Rockies? Then alfalfa honey is the taste to bring it back. Although alfalfa is grown all over the country, there is something in the soil or climate of the Great Plains that distills out of these blossoms the most exquisite honey of its kind. More delicate still, and ruby-rare, is the honey from those pinewoods of the Great Lakes States, where red raspberries have taken over the clearings. Down around Uvalde, in Texas, they boast they have the best honey in the world—that is made from cat's-claw and huajilla. Or will you have your honey out of the blossoms of Missouri bluevine, Michigan milkweed, Maine blueberry, or just from the goldenrod of New York state? Some of these may be found on the market, and some are so choice that, to get a taste, you must go where the bees make them.



Honeybees commencing to build comb on a wax foundation. The foundation is pressed from sheet wax by machine, but no man has ever produced an artificial comb.

Here in California it is sage honey I go hunting, that essence of the purple sage, holding the rough sweetness of the West in it, the gold of our sunburnt hills, some tang of the Pacific. In the southern Appalachians not even a sign would tell me where to look for sourwood honey; but any cabin with a row of "bee gums" near it would be my goal.

"Each bee is but a unit in the unceasing airlift that may fly 17,000,000 miles a year to supply a single bee city with food. For it takes about 480 pounds of honey just to keep one hive alive."

For this dark brown ambrosia, gathered by a humming horde from white bells high in the forest, is a collector's item among honeys, and well worth an hour's careful chaffering with the shy mountain people who so rarely sell it, holding it dearly with an understandable pride.

Perfect as it is as a food, honey is more than that to the honey-hunter. It is a gift from thousands of ardent and dedicated little lives. It is evidence of some marvelous integrity in a world where bee and flower live for such mutual good. It is a slow-formed, perfect drop upon a growing tip of evolution; to take that drop upon the tongue is to partake of a sacrament with Nature.

★

Bracken

By LEE ST. LEDGER-ROTY

Proud bracken, bowed like an old, old man, withered and
sere
Brown stems of green grown cold from summer past
What are you waiting for in the damp, in the mist—
What are you reaching for as I pass and you grasp my
ankle?
Is there something you would say to me, a mortal?
Will you tell of tiny loves within your green—
Of the furred and feathered pulse hid fearfully—
Of silent death dissolving willingly
In your purposed shade, all of a summer past?

Hasten and speak then, bone of a short-dead season
I will listen well to hear creation speaking!

★

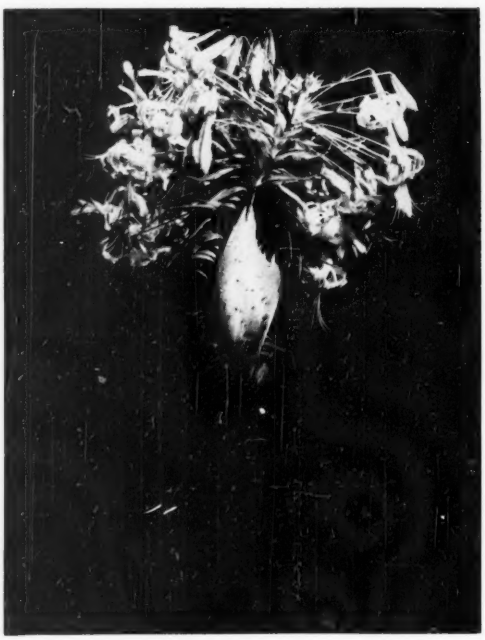
They Call It a Disease!

By ANNIE J. TALABERE

FASCIATION! Has it happened in your garden? Your dictionary probably lists it as "a flat, ribbon-like malformation in plants. A cluster or bundle, as of leaves, flowers or stalks, which proceed from a common plant." It has even been termed "An unexplained abnormality — a condition caused by disease."

And then again, the fairies may just plant a funny little seed under, say, a *Lilium henryi* bulb, and, suddenly, the stalk zooms up into a Jack-and-the-beanstalk condition. That is fasciation! The soil is rich and heavy with compost, there is much shade and lots of moisture, and there the plants have lived for quite a while and become really crowded. Nearby shrubs push and shove greedily. All at once, a weird, flat stem shoots ahead of all its brothers and sisters and cousins, as if trying to "get away from it all." The leaves pop out all over the stem, like the clover leaves in those flat chains we used to braid. All the time, that stem grows up and up.

At last comes literally the crowning glory. An unbelievable "bundle" of blooms unwinds, untangles, spreads out into one magnificent flower. The tiny green buds have expanded into eager golden bells. Last year in our garden, one "malformation" gave us



68 blossoms and the other won with 72. That is fasciation! If a disease, why not have a lot more of it?

The Blessing of the Land

By ROBERT C. BAUR

Illustrated by William H. Bodge

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THE last Thursday in November has been set aside in our country as a national day of Thanksgiving. At this time we gather with our loved ones around tables laden with the fruits of the harvest. Thanksgiving is a major event on the American calendar, yet the custom of blessing the land at planting time is little known in this country. We plant a seed, and, although it has been tested at the nursery and, perhaps, coated with a substance for better germination and protection from disease, the basic requirements for its growth are good soil, plenty of sunshine, and sufficient rainfall. Leaving the seed in the earth, our duties are done, other than to loosen the soil and keep the weeds from choking the young plants. In some desert regions, man regulates his own watering through irrigation, but even then he does not manufacture the water, but depends on reservoirs often hundreds of miles distant to water his fields.

One takes a chance when he plants a crop, for the elements of Nature are seldom dependable. Fair weather may produce an abundant harvest, but flood or drought can leave the planter penniless. It has been said that no one depends on God more than the farmer, and it is certainly true that he who plants does so with a prayer on his lips.

The ancient peoples were aware of the insignificant role they play in the mystery of a sprouting kernel of grain, and processions to the fields were held annually as a part of their symbolic worship of Nature. Prayers were intoned and holy water was sprinkled upon the newly ploughed furrows to increase fertility and protect the crops from harm. The North American Indian observed a similar practice, and, amid the shaking of rattles and throb of drums, ceremonial rites were performed to call the Great Spirit's attention to the new crop of corn.

The Romans celebrated a festival each spring at planting time known as the Robigalia. Processions were made to the fields by the way of the Flaminian Gate to a sanctuary at the fifth milestone of the Via Claudia, where a dog or sheep was sacrificed to avert blight from the crops. Under the rule of Constantine the heathen ceremonies were abolished and the processions became Christianized. Supposedly, the Christians adopted the custom to counteract the celebration honoring the Roman gods. The twenty-fifth of April was reserved for the occasion, and later came to be known as the "Major Rogations," the word rogation coming from the Latin *rogare*, which means "to ask."

Beside the "Major Rogations," the western branches of the Christian Church have set aside the three days preceding Ascension Day as a time for blessing the crops. Also called "Minor Rogations," supplications are made at this time for all things to work according to God's plan so that the earth will yield her increase. The present custom of blessing the crops before Ascension Day originated in the city of Vienne, in Gaul, about the middle of the Fifth Century. Earthquakes, fires and other misfortunes had visited the city, endangering the crops, and famine threatened the land. To remedy the situation, St. Mamertus, Bishop of Vienne, after a night's vigil before the cathedral altar, ordered a solemn fast and public supplication of three days to appease the wrath of the Almighty. The litany was chanted in procession to the fields, where the new crops were blessed and prayers offered for their growth and well-being. The results were gratifying, and, thereafter, these three days of supplication were observed annually and the practice soon spread throughout Gaul and beyond the Alps. Mamertus has been said by some to be one of the world's first conservationists because he brought to the attention of the French farmers the value of the land and the importance of taking care of it properly.

The Fifth Synod of Orleans, convening in 511, decreed that in all of Gaul the litanies would be celebrated on the three days preceding Ascension Day. On these days all menials were to be exempt from work, so that everyone would be free to attend divine services. Persons not observing the Rogations were subject to punishment by the bishop. Some centuries later these "Minor Rogations" were recognized by Rome and included in the services of the Church.

The custom of blessing the land crossed the channel to England, where it was confirmed by the Coun-

cil of Cloveshoe. Rogations were to be observed the twenty-fifth of April "after the manner of the Roman Church" and on the three days before Ascension "after the tradition of our ancestors." These Rogations were to be of a spiritual nature, taken seriously by the people, and horse-racing, games and junketings were forbidden. Rogation days were highly esteemed in England, and, according to the laws of King Arthur, a theft committed at this time was equal to a crime performed on Sunday or a high church holiday.

Special prayers and processions were still observed in many English churches at Rogation-time, and the Book of Common Prayer lists a Collect, Epistle and Gospel for the occasion. However, blessing the crops was discontinued in the thirteenth year of Elizabeth's reign. Although sanctioned by the church, the Rogation ceremonies were actually a carry-over of the Roman cult celebrated in its Christian form. Priests in surplice and cassock led the processions, followed by the lord of the manor carrying a banner and the rest of the parish with hand bells, crosses and staves. The procession would wind about the fields, stopping at wayside shrines and forming crosses on the ground. Rogation days were intended for prayer and fasting, but many of the old Roman customs were still in evidence. Therefore, after the Reformation the pomp and ceremony was abolished and the processions, retaining little of their religious flavor, survived only in the perambulation of the parish boundaries.

By order of Queen Elizabeth it was required that the parish boundaries be surveyed once a year—preferably at the accustomed time of the former Rogation ceremonies—under the supervision of the curate and other prominent citizens of the community. Upon return to the church, common prayer was to be made, and the parson, at various places during the perambulation, would give thanks to God as he beheld his benefits, and make supplications for the abundance of the earth.

Also known as "gangdays," "cross week," "processioning day," or "beating the bounds," the surveying of the parish boundaries was an occasion for merrymaking. Refreshments were sometimes provided, and at Edgecot, in Bucks, there was an acre called "Gang-Monday-Land" that was rented for three pounds a year to be spent on beer and cakes for those who took part in the perambulations. At Clifton Reynes, in the same county, a bequest of land directed that "one small loaf, a piece of cheese and a pint of ale should be given to every married person who walked the parish boundaries in Rogation week." Unmarried residents of the town were not forgotten, being provided with bread and cheese and a half pint of ale.

Back in Eighteenth Century England it was feared, in some rural villages, that measurements put on paper might be stolen or destroyed by fire. To prevent such a mishap from taking place, small boys were beaten at various places along the boundary. The town fathers were certain the measurements of the parish boundaries would be safeguarded as no boy would ever forget the spot where he had been whipped. If the boundary was marked by a stream, the boy was not beaten but tossed bodily into the water, the fact that he might be unable to swim making little difference in event the water was swift and deep. For larger bodies of water the victim was held by the heels and dunked from a rowboat. The boys, selected at random from the crowd, seldom ran away, for, like a game of chance, there was a possibility of not being honored to mark the boundary. The weaker sex was not spared, and "bumping," a milder form of treatment, was used on the girls. "Bumping" was done by holding the lady upside down and knocking her head upon the boundary stone. Girls were thought to retain the indignity of being "bumped" much longer than boys, and those places most likely to be forgotten were given the feminine touch.

"Beating the Bounds" has been revived throughout England in recent years, but the whippings have given way to more humane measures. The boundaries are thrashed with sticks, or someone is mildly "bumped" for tradition's sake. At one place near Clacton, where the parish bounds end in the center of the railroad track, a boy is "bumped," between trains, on the cinder bed within the rails.

The break with Rome abolished many of the processions in the Lutheran provinces of Germany, but in some places the church has retained the ancient Rogation ceremonies. The crops are blessed on the fourth Sunday after Easter, or on an appointed day during the month of May. Preceded by a crossbearer, the townspeople march to the fields, and on these occasions the old liturgies of the church are used.

Rainy Day in April

By MAY ALLREAD BAKER

A scarf of green lies on the hilltop's crown
That long had worn a covering of snow.
While from the South the winds begin to blow
Languid and warm; and rain comes softly down
Alike on countryside and busy town,
Washing the soot from street, and roof and spire.
Borne on the still air, high and ever higher,
The cock flings out his shrill and clarion crow.
Beyond the meadows, green as emerald plush,
The thawing furrows mellow for the plow;
Soft, brown buds swell on every tree and bush;
Blithe, homing robins chirp of summer now.
While sullen thunder peals, abrupt and loud,
And lightning zigzags from a torn, black cloud.

Planting time has given rise to many superstitions and customs that have been handed down through many generations to become a yearly event in the countryman's life. Prior to the Rogation season, the inhabitants of England's west country wassail the orchards to insure an abundance of fruits the following summer. Highlight of this traditional ceremony is the firing of guns into the fruit trees after dark to force the evil spirits from their dwelling place in the branches.

In Brittany, where the entire village follows the parish priest and town officials through the countryside to bless the fields, it would be unthinkable to go any way other than the route traveled for centuries by the Rogation processions. Should the path of the procession be knee deep in mud and water, the course is not revised, and everyone, vested clergy included, wades through and resumes the march on the other side. The English also uphold these customs and the records of a London parish tell how the procession was once blocked by a nobleman's carriage. Stubbornly the coachman refused to move without orders from his master, and the parish leaders would not agree to walking around it. The problem was finally solved by opening the carriage doors and the procession passed through in single file.

Observing the custom in America, the crops were blessed last spring on Rogation Sunday in the traditional Old World style at historic Saint Paul's Church in Norwalk, Connecticut. Following the suggestion of Richardson Wright, editor of *House and Garden*, the land was blessed by parishioners bringing soil to church from their fields and gardens. When the first Saint Paul's was built, the fields lay nearby and cattle grazed upon the village green. However, the little hamlet, burned by the British during the Revolution, has increased its population, and the present church edifice is no longer surrounded by open country. Since the congregation could not conveniently go out into the rural area, the fields came to church in individual flower pots, pasteboard boxes and paper bags, each labeled with the name of the owner. A table was placed on the chancel steps to receive the soil, which came from back-yard vegetable plots and petunia beds, orchards, farmlands and the formal gardens of spacious country estates.

"No black magic is expected," the rector announced in the Church Messenger, "but by bringing in some soil from our gardens we ask a blessing upon the new crop and give thanks for the benefits of Nature. Rogation days are not only a time for asking but also a period of thanksgiving."

Preceding the choral celebration of the Eucharist, the Litany was sung in procession by the choir and clergy. "Deliver us from lightning and tempest, pestilence and famine and preserve to our use the fruits of the earth, so as in due time we may enjoy them"—petitions voiced by the church for countless centuries. The uncertainties of medieval life prompted the prayers to include such requests as deliverance from the evils of pestilence, famine and sudden death. The Gallican Rogation Litany makes reference to the crash of the falling world, and the York Litany mentions persecution by the pagans, which, from all indication, were the invading Danes.

The earth was blessed before the high altar with the service written by Mr. Wright for the occasion, beginning with the lesson from the Book of Revelation.

"And he showed me a pure river of water of life, clear as crystal, proceeding out of the throne of God and of the Lamb. In the midst of the street of it, on either side of the river, was there the tree of life, which bare twelve manner of fruits, and yielded her fruit every month; and the leaves of the tree were for the healing of the nations.

"O Lord who didst exalt thy humble servants and gardeners, Dorothea, Fiacre, Phocas and Isidore the Laborer, to be numbered among thy saints, Grant that we thy people may in life ever have our hands on the plough and our hearts ever blessed with thoughts of Thee, that through their intercessions, our gardens, orchards and fields may produce the profit and beauty of thy earth for all. The earth is the Lord's and the fullness thereof. Alleluia!

"Bless this earth, O Lord with thy heavenly bounty, that in seed-time and harvest it bring increase, for the strengthening of our souls and bodies and the glory of thy holy name. Amen."

At the conclusion of the service, the containers were claimed by their respective owners, and those who wished it returned the soil to the gardens and places from which it had been taken. Whether amateur gardener or veteran husbandman of many seasons experience, the business of planting was then begun, in confidence in the care of the Almighty.

The United States, a country of many geographical divisions, has been gifted with a variety of soils and growing seasons. This year, as the newly ploughed earth is planted, from the rocky fields of New England to the sunny valleys of California, we should be grateful for the blessings of Nature that have made our country the richest in the world. Then, like the ancient bishop of Vienne, let us ask that the earth yield her increase, so that America may always be a land of plenty.

★

The slimy salamander, a terrestrial, lungless species, captures harvestmen, ants, spiders, beetles and snails with its jaws, chewing them with tiny teeth. Its tongue will not protrude as in other salamanders, and the sticky slime is not employed in the capture of food.

Slime King of the Woodlands

By ROMEO MANSUETI

Illustrated by the Author

NATURE'S harmless creatures employ a wide variety of weapons in order to escape from enemies. The slimy salamander is one of the most peculiar examples.

When I was fourteen, and acquiring an intense interest in Nature, a neighbor gathered a few of us together for an "expedition" to the mountains, allowing us to hunt specimens by lifting rocks and overturning logs. In the decayed pulp under a huge, rotten log on a hillside, I discovered a glassy-looking, blackish, lizard-like animal about seven inches long, with silvery-white specks profusely scattered over its body. It remained motionless, but I dove savagely at the poor animal for fear it would escape. Clutching it tightly, I yelled for help.

"Whatcha got?" demanded one of the boys.

When I tried to open my hand, I could not. My hand felt as if I had grasped a long piece of sticky taffy. Gradually my fingers opened, and the creature's shiny skin was now transformed into a dull, brown color. It had given off a quantity of sticky slime. Mixed with fragments of wood pulp, this glue almost obscured its smooth, graceful outline. Now I realized why the slimy salamander had been so named.

The neighbor-guide took one look at it and exclaimed: "Close your mouth and throw that thing away! It'll jump down your throat and choke you."

The "slimy" struggled feebly after my rough treatment; then, quite suddenly, it plopped out of my hand to the ground. "There, you see, it's trying to hop in your mouth." I was warned. It hardly progressed more than six inches with the snap of its back and tail. Salamanders cannot possibly jump into a human's mouth, but to this day some of my friends persist in this ancient belief. On the ground, the slimy progressed with a sort of leaping and wriggling motion, seeking to bury itself beneath the pulp.

For several days after that catch, I had a difficult time removing the sticky stains from my hand. During the experience I noticed no offensive odor and suffered no ill effects from the contact.

How Nature provided some of its members with a protective mechanism of slime intrigued me. Later I discovered, by experimentation, that other salamanders, toads, slugs, land snails, catfish and eels employ the same ruse for escape. Specimens have to be picked up gingerly to avoid having one's hands soiled by the glue-like slime. A fellow salamander collector once remarked, "It cramps my collecting style for hours after grabbing a slimy."

If grasped by the tail, the slimy will drop it to escape, as well as exude slime. This habit is not in-

If a female slimy salamander is attacked by a ring-necked snake as she guards her eggs, she will exude a sticky slime from her skin, struggle violently and possibly bite in order to escape. The salamander's mucus is not irritating in effect except to the mucous membranes of the eyes and mouths of enemies.

jurious, since it will grow a new tail. Actually the split occurs between the vertebrae. After blood clotting, the epithelial cells of the edges of the wound grow out over the exposed surface. Even legs that are snapped off will frequently regenerate. Occasionally salamanders may develop forked tails or extra digits.

The slimy is especially remarkable for the development of prehensile powers in its tail. Wrapping its tail around one's finger, the creature will dangle there for an almost indefinite time, particularly when handled gently.

Superficially, the salamander resembles a licorice stick sprinkled with large grains of salt. The small, snowflake-like spots on the sides and back of its deep blue-black body camouflage the animal on the black humus streaked with white rootlets so often seen under stones and logs.

One salamander that I observed with a hand lens remained surprisingly motionless. The skin was closely lined with many glandular pores for secreting its protective slime. These pits were largest on the upper surface of the tail and more scattered near the belly region. When touched, the animal wriggled away with quick, jerky movements. When I prevented its retreat by pressing its back down with a stick, drops of milky, viscous liquid immediately poured out on the surface from the shallow pits that I had just observed.

This liquid looked so formidable that it reminded me of the dendrobate toad's skin secretions used on arrows by Colombian Indians. The salamander's mucus is not irritating in effect except to the mucous membranes of the eyes and mouth, but the acrid properties are probably toxic enough to keep the slimy salamander from being eaten so often as other members of its clan that it encounters in the woods.

This animal is particularly common in caves. The constant temperature and moisture, even in winter, insure year-round activity in such surroundings. Once I uncovered fifty individuals in four hours of collecting on a mountain side. Despite the abundance of this species, especially in the highlands, naturalists know next to nothing about its life history. Whether it revels in forest mold or under fallen logs, it continues to veil its breeding habits from human eyes. Even when it gazes saucily from the entrance of its burrow, it seems to mock the investigator.

The slimy ranks as a paradox among the lower vertebrates. It has no lungs or gills in the adult state, yet it lives on land, never in water. How the young could be raised on land was a mystery for some time. Breathing through the skin and mouth linings may sound fantastic to humans, yet slimy salamanders do just this. Scientists have discovered that blood capillaries penetrate to the epidermis to facilitate skin breathing. The gas interchange, however, can only take place if the skin is moist.

As slime king of the woodlands, the slimy salamander lives in an environment befitting slime royalty. The towering trees that shade the moist woodlands also keep the forest floor cool and wet. Strolling through such a forest, one may be impressed by the high humidity. The luxurious growth of ferns and rhododendrons lends an exotic aura to the humus-covered floor. Underneath are layers of flat stones, piled on one another, and forming a bottomless labyrinth. This favorite habitat for salamanders forms catacombs, which provide haven during periods of drought and hot weather. During winter, too, they crawl deeply into the subterranean strata to escape

from the obvious danger of the frostline and snow.

In rearing their young, slimies prefer to keep their habits almost "top secret." According to several individual records, the eggs of the northern forms are laid in spring, while those living in the central and southern region in eastern United States deposit their eggs in summer. The eggs, which look like a small bunch of white grapes, or a group of shiny pearls, may number more than a dozen. Herpetologists have concluded, from experiments with the breeding of plethodont salamanders in the laboratory, that odor is one of the factors in sex recognition among them during courtship.

The female may attend the eggs by coiling around them. Deep in the moist recesses of rocky crevices or in burrows under forest humus, the eggs receive a constant source of moisture from the surroundings. The embryos develop in the egg. After the larva escapes from the egg-envelopes, the gills probably remain only a few days, as in the larval stage of the terrestrial red-backed salamander. Thus, when the youngsters make their debut, they develop without ever entering the water. They are on their own from then on.

The epitome of delicacy among salamanders are young slimies. Although only an inch long, they look like perfect replicas of their parents. They are quite active and grow rapidly, feeding on spiders, mites and larval insects. The adults feed on insects, such as click beetles and weevils, ants, snails, small worms, millipedes and spiders. Food is captured by the slimy pouncing on the victim with open mouth, finally to be chewed by the almost microscopic teeth. The tongue, which some other salamanders use to capture prey, cannot be protruded from the mouth by the slimy. It is attached along the middle line of the mouth with the rear portion and sides free.

In turn, the slimy salamander must appear like a delightful morsel to a hungry ring-necked snake, one of the salamander's most common neighbors. The salamander's uneventful life has its exciting moments when a seventeen-inch snake tries to capture and eat it. The snake is agile and can quickly catch most salamanders, but the sticky exudation and the violent movements of the salamander will shake off most reptilian pursuers. Occasionally, however, ring-necked snakes catch and swallow unwary slimies.

Once I lifted a flat rock on a mountainside and found a venomous copperhead snake and a medium-sized slimy resting peacefully together about twelve inches apart. I have found ring-necked snakes and salamanders under the same rock many times. When grasped by human hands, slimies will bite. Such defense is fruitless, since the tiny teeth and weak jaws are incapable of inflicting injury.

Slimies generally "freeze" when uncovered. This results in their frequently being overlooked by enemies. They are particularly apt to be quiet when they feel themselves tight up against a stone or log—the wide, open spaces make them uneasy.

At night the slimy salamander may be spotted with a flashlight as it progresses slowly over rocks and leaf mold in quest of food. Most salamanders are night wanderers, but can see well during daylight even though they remain hidden. Nevertheless, following a rain during the day, they are likely to be found along roads and streams seeking a place to escape from the excessive moisture.

Despite its lungless nature, the slimy utters audible, mousey squeaks when in distress from handling. These noises are probably mechanical, since vocal cords are lacking. Air is probably gulped down and expelled during a struggle. The air is forced from the mouth with such vigor that the sound is produced.

When Jacob Green, the early American zoologist, named it *Plethodon glutinosus*, he alluded to the gluey, mucous secretions and produced one of the most realistic Latin names ever used. Throughout its range from New York south to Florida, west to Illinois and Texas, the slimy is popularly known by such terms as "sticky," "salt and pepper," "blue-spotted," and "gray-spotted" salamanders. One population in southwestern North Carolina sports red spots or flecks on top of the legs, and is known as the "red-legged salamander," *Plethodon glutinosus shermani*.

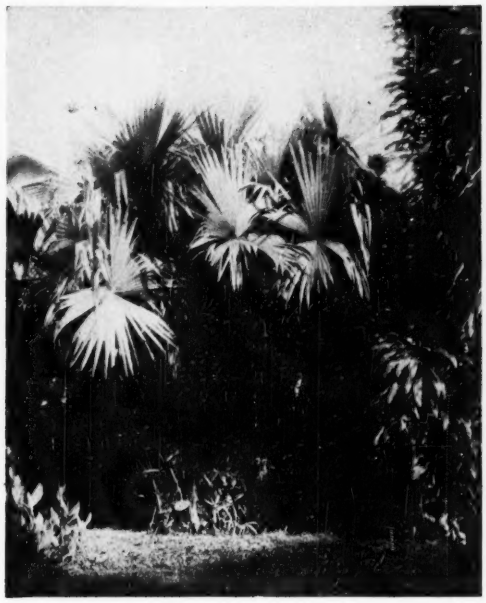
There are certain herpetologists who have periodic headaches trying to distinguish the slimy from the Jefferson's salamander, which is found in the same vicinity and looks much like the former. A salamander detective is often required to separate them and to solve other mysteries of the slimy salamander's life. Perhaps in the next few years he can help fill in some of the appallingly empty gaps in our knowledge of this creature—or, at least, get his finger sticky.

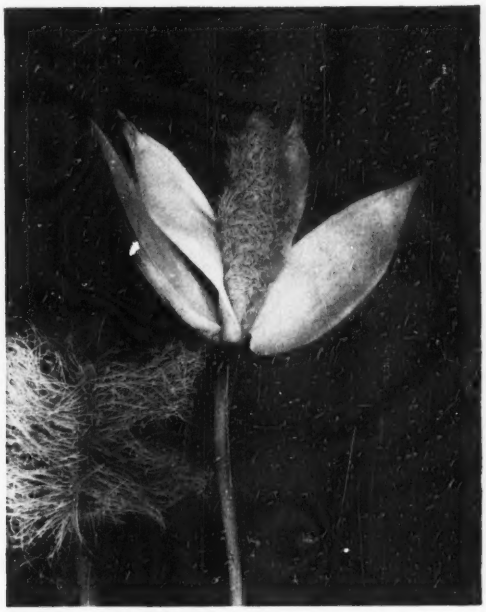
★

New Born Spiders

By DANIEL SMYTHE

Where the tall rooftree greets the day,
A hundred tiny spiders play,
Revelling in freedom they have won,
And drinking up the warmth of sun.
The baby spiders hurry down,
Clad in their livery of brown.
Each one strings out a thread so small
It scarcely can be seen at all.
Their corner warms and makes them more
Active and playful than before.
The sky seems to be looking in
Where many webs of life begin;
And climbing ladders of the sun,
They hold secure what they have won.





The Panama-hat plant—a vigorous specimen used as an ornamental in its native range in Panama. At right, inflorescences of the Panama-hat plant. In the center is an inflorescence—technically a spadix—newly exposed by the spreading of the four leaf-like spathes, which tightly enclosed it. The twisted white filaments that cover over the spadix are staminodia or sterile stamens of the female flowers. At lower left the spathes have fallen and the staminodia spread out before dropping off. At lower right the staminodia have also fallen, revealing the little greenish flowers, male and female together, over the spadix.

The Panama-Hat Plant

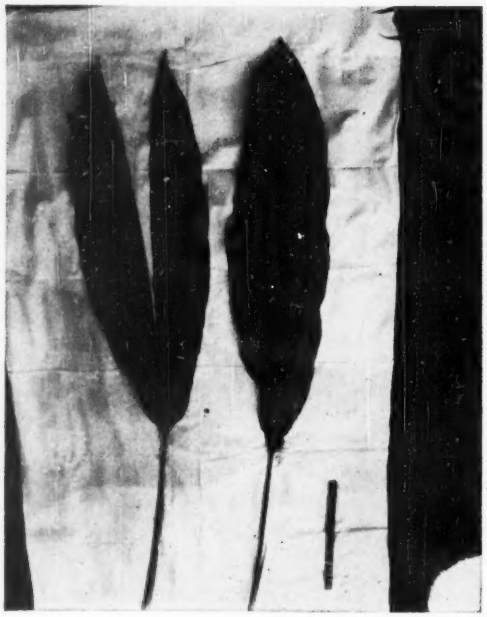
By ALEXANDER F. SKUTCH

ALTHOUGH the plant from which Panama hats are made resembles a trunkless, fan-leafed palm, actually botanists classify it in the distinct but closely related cyclanthus family. The Panama-hat plant, *Carludovica palmata*, grows wild from southern Mexico to Peru. It attains its best development in low, wet districts, especially in the lush, second-growth vegetation that springs up in abandoned banana plantations and other neglected clearings, along river banks, and at the edge of the forest, where it thrives in company with other great-leafed plants, including shell-flowers and wild plantains. In heavy forests it is less frequent.

The stems, which are largely subterranean, branch underground to form great, compact clumps. From each springs a cluster of long, slender, cane-like, green leaf-stalks, which in vigorous plants hold the leaf-blades from ten to fifteen feet above the ground. Each blade, three or four feet broad, is creased by numerous folds that radiate from its point of attachment at the top of the petiole. Deep indentations, which reach nearly to the center, divide it into three or four principal lobes, each of which splits up toward the margin into a number of slender, ribbon-like extensions. To make hats, the leaf-blades are gathered before expansion, when their tender tissues are still folded together like a Japanese fan. Then they tear easily into long strips of the width appropriate for hat-making. Although formerly manufactured as a cottage industry in parts of Central America, most Panama hats now come from Ecuador, to be sold, perhaps, to tourists who pass through the Panama Canal.

The flowers and fruit of this odd plant are as interesting as its foliage. The cylindrical inflorescence is borne on a short stalk that emerges between the bases of the long petioles. It is at first enclosed by about four, long, broad, leaf-like spathes, whitish on their inner faces. These soon fall away, revealing a compact mass of twisted white filaments that cover over the inflorescence. The long white threads, sterile stamens of the female flowers, spread out, then soon drop off, exposing a multitude of crowded little green flowers devoid of petals, symmetrically arranged, male and female together, over the entire surface of the fleshy axis, an interesting plant.

Ripening and ripe spadices of the Panama-hat plant. In four of the spadices the outer layer has begun to peel off from the top downward, revealing the yellow fruits, each the size of a large pea, embedded in the bright red tissue.



Leaves of *Cyclanthus bipartitus*. At the right is a newly expanded, undivided leaf; at the left a similar leaf, which at a touch split along the central line of structural weakness. The ruler, lower right, is one foot long.

When mature, the fruits are embedded in the outer layer of a thick cylindrical body about nine or ten inches long by one and a half to two inches in diameter. The exterior of this fruiting spadix is green and sculptured in a symmetrical pattern by the protruding ends of the fruits. The thick, fleshy tissue in which the individual fruits are embedded now splits away from the central axis, beginning at the top and curling outward and downward. It is bright red, and so, at first, is the naked axis from which it has just separated, forming a splash of brilliant color conspicuous from afar. As the red rind of the spadix peels off it exposes the yellow fruits, each the size of a large pea, and filled with many tiny, flattened, whitish seeds. Although these mucilaginous fruits are almost tasteless to the human tongue, they are eagerly devoured by birds. Among these is a tanager of which the male is jet black, with a scarlet rump even more brilliant than the fruiting spadix that attracts him. By these winged carriers the little seeds of the Panama-hat plant are spread far and wide.

The cyclanthus family is restricted to the American Tropics, where about fifty species are known. Most of these are included in the genus *Carludovica*, hence are close relatives of the Panama-hat plant, although in appearance and mode of growth they are quite distinct from it. Instead of rooting in the ground, their slender, elongate stems cling to the trunks of trees by means of aerial roots. The long leaves, standing out from the supporting trunk on slender stalks, divide somewhere above the base into two tapering, pointed lobes. These bifid leaves have a pleated surface and are easily recognized; they are abundant in the lowland rain-forests of tropical America. The inflorescences of these aerial species of *Carludovica* resemble that of the Panama-hat plant but are generally smaller.

Cyclanthus bipartitus, which gives its name to the family, is a most interesting plant. Widespread in tropical America, it grows lushly in low ground, often along streams, and not infrequently in company with the Panama-hat plant. The stems are largely subterranean, and the big leaves stand nearly upright on stout petioles to a height of six or eight feet. Each leaf-blade, when it first expands, is entire and broadly lanceolate in shape, tapering to both ends. There are two principal veins, which diverge from the base and converge again at the tip. Far from having a strengthening vein along its middle line, the tissue of the leaf is here weaker than elsewhere. A touch causes it to split along the center, almost or quite to the base, and it then takes the form responsible for the name *bipartitus*. In the absence of human experimenters, wind, rain, animals brushing past, or perhaps even internal strains are sufficient to cause the young leaf

to divide into the two segments typical of those that have been long expanded.

It is of interest to compare the leaf of *Cyclanthus* with other big leaves that develop as a single, continuous tissue and then split up. The blades of developing palm leaves form a single sheet thrown into many parallel folds; by the death and break-down of the tissue along some of the creases, they divide into distinct segments before expansion, thus giving rise to fronds like that of the coconut palm with its many ribbon-like divisions. In most palms the splitting occurs along the creases on the outer or lower side of the embryonic leaf; the upper creases remain intact, hence each segment of the mature leaf is folded downward. But in a few exceptional palms it is the upper creases that give way while the lower ones persist, and the pinnae of the frond are folded upward. In the banana and some related plants, the leaf usually unrolls as a single huge sheet of tissue, but everywhere except in the most sheltered spots it is soon torn by the wind from margin to massive midrib, the number of tears depending upon the intensity of the breeze. Although the direction of the veins and absence of transverse strengthening allow the banana leaves to split easily, there is no structural modification that causes them to divide between one pair of lateral veins rather than another. In its time and manner of splitting, the cyclanthus leaf stands midway between those of palms and those of bananas. These exotic plants that serve us are full of fascination.

★

Unscramble the Hidden Nature Names

By HUGO H. SCHRODER

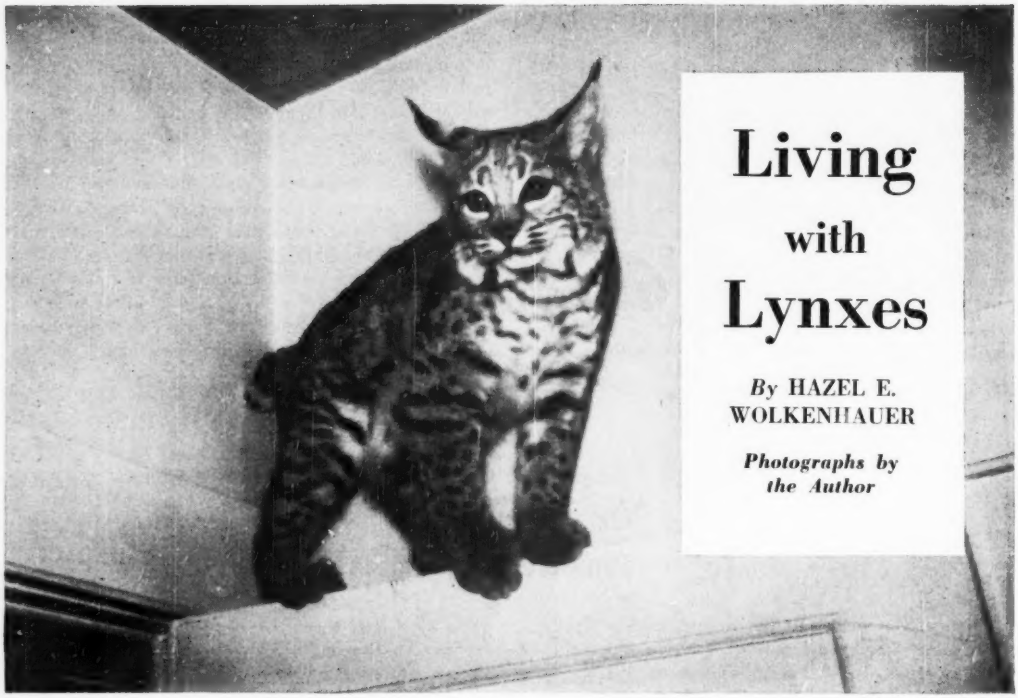
FILL in the spaces in the first column with the names of animals, birds or plants, for which clues are given. In each of these words are letters, which when unscrambled, spell another nature name. For example: — — — — — — — 7 letters; a well known, big beaked, diving bird (pelican); the hidden word has 4 letters, — — — —; the plural of an insect feeding on the bodies of animals, (lice). Try your skill at guessing the names in the first column, then pick out the scrambled letters to complete the hidden name. Easy? Maybe not. Let's go. See page 194 for the proper unscrambling.

1. - - - - - - - - ; carrion feeding bird.
2. - - - - - - - - ; commonly known as pinks.
3. - - - - - - - - - ; t h i s male bird is henpecked.
4. - - - - - - - - ; the wild form of this is known as crane's bill.
5. - - - - - - - ; *Anas platyrhynchos.*
6. - - - - - - - - - - ; one of the tube nosed swimmers.
7. - - - - - - - - ; crested red bird.
8. - - - - - - - - - - ; a l s o called Clark's crow.
9. - - - - - - - - ; one of the upside - down birds.
10. - - - - - - - - - ; gaudy colored bunting.

1a. - - - - ; western bulrush.
2a. - - - - ; fish of the herring family.
3a. - - - - ; oil is made from this plant's seeds.
4a. - - - - - ; fibre producing plant now being cultivated in the southern states.
5a. - - - - - ; cameloid ruminant.
6a. - - - - - - - - ; European bird; *Saxicola.*
7a. - - - ; also known as tick bird.
8a. - - - - ; this fish meat goes good in in a salad.
9a. - - - - ; un-warbler-like warbler.
10a. - - - - ; fruit related to the apple.

11. - - - - - - ; *Pica hudsonia.*
12. - - - - - - - ; this family of songsters is numerous.
13. - - - - - - - - - ; sometimes called calico bird.
14. - - - - - - - - - ; believed to be a weather prophet.
15. - - - - - - - - - ; l o o k for this bird in high elevations.
16. - - - - - - - - - - ; chiseling bird.
17. - - - - - - - - - ; sea pigeon.
18. - - - - - - - - ; virgin's bower.
19. - - - - - - - - - - ; this insect seems to chew tobacco.
20. - - - - - - ; its blossoms are very fragrant.

11a. - - - ; porker.
12a. - - - - ; *Porzana carolina.*
13a. - - - - ; community nesting sea bird.
14a. - - - - - - ; prefers fuzzy caterpillars.
15a. - - - - ; marine flatfish.
16a. - - - - ; as black as a crow.
17a. - - - - ; they follow fishing vessels.
18a. - - - - ; South American holly, or a beverage made from its leaves.
19a. - - - - - ; its fruit grows in clusters.
20a. - - - - - ; one of the water lilies.



Living with Lynxes

By HAZEL E. WOLKENHAUER

Photographs by the Author

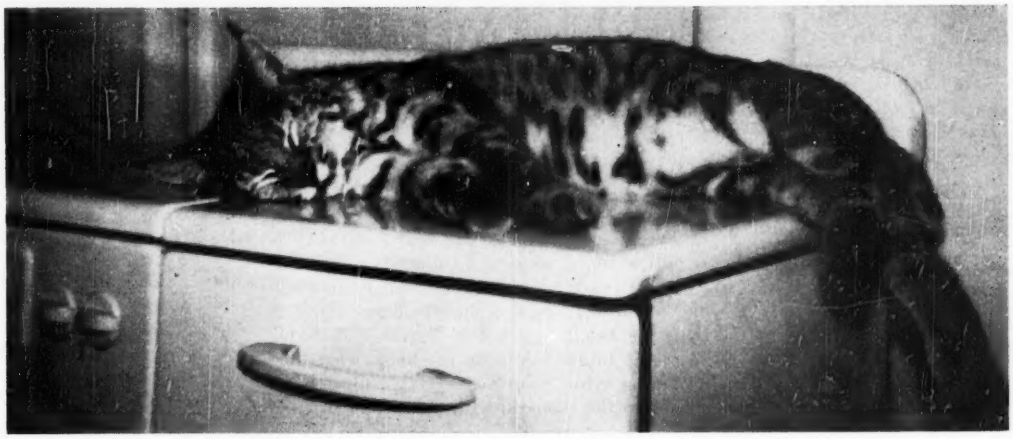
In a sense, a lynx is not a pet for small children. Because of its active nature, it is at times extremely rough while at play. It is a common event for the Wolkenhauers' lynxes to scramble up the nearest door while in the midst of a game of "chase-me," balancing with ease. Thus, the rooms of their home all bear claw prints, which would make a lynx an undesirable pet for a fastidious housekeeper.

A bay-lynx is a beautiful cat, and, if obtained very young, can become a most interesting house pet. It is especially fascinating to observe the comparison between a lynx and its common house-cat cousin. It goes without saying that both species are extremely curious about everything that goes on in the home, and this bobcat is investigating the subject of a watched pot boiling.

It is an interesting life—living with lynxes. We had always wanted such house-guests, but most available bobcats were trapped as adults, and, we feel, all grown wild animals belong in the wild. Finally, however, we heard of a pair of bobcats that had been hand raised after their mother had been killed, and we bought them, sight unseen.

We have done our best to give our guests as natural an existence as possible. They receive nothing to eat except assorted raw forms of meat, chicken, and rabbit. We cannot get them to accept fish. They are given the full run of the house, without even a collar. For fresh air and sunshine they have a large outdoor runway, in which we have improvised trees. Also, they have ramps to and from which to leap.

The kittens were four months old when we acquired them, but still young enough to ac-



Though more active than a common cat, a lynx also takes time out for cat-naps. There is no favorite spot, for these lynx pets have been found napping atop the kitchen stove, high above cupboards, under beds, and even in empty laundry trays. This makes their owners wonder if the lynx does not roam constantly in the wild, rather than maintain a permanent site for a home, except, of course, when a mother lynx has a litter of youngsters to care for.

cept new owners. They were still kittens then, brother and sister. We have had them for nearly two years, and by the end of that time they had reached a weight of twenty-six pounds each, although the male remained for a long time about two pounds lighter than his sister. We keep a flash camera loaded and ready to record the activities of our pets, and the pictures on these pages are some items in such a record.

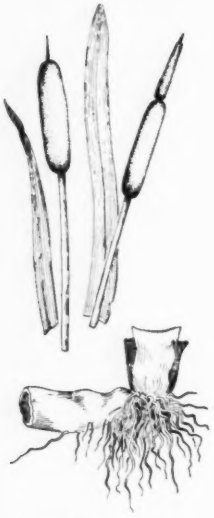
The lynx seems to be more alert than its housecat cousin. The Wolkenhauer pets will run to the door when either the phone or door bell rings, and all outside noises are immediately investigated by peeking from the nearest window (above). On the other hand, house cats will ignore all such noises. The lynx seems to take a great interest in life, and is far less lazy. The female lynx learned several clever tricks. She will roll over at the command of "Dead Cat!", and has never failed to do so, even once. She will eat from the table, while seated on a chair, but more often than not will end up with both front paws on the table. She plays a grand game of hide-and-seek, and will actually run to hide when she finds one of the family in a hiding spot. Her brother, however, refuses to as much as try to learn a trick, and is content to be just an observer.

Edible Weeds

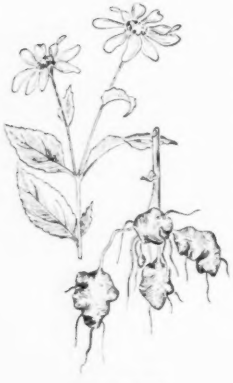
By E. LAURENCE PALMER

Illustrations by Mary Louise Van Alstine

JACK-IN-THE-PULPIT



BROAD-LEAFED CATTAIL



JERUSALEM ARTICHOKE

I RATHER think that most animals are naturally hungry most of the time. I doubt if man is an exception, and I am sure that I am not. Of course, for a while, after a good meal, we take it easy, but the snack habit is rather well established, in spite of the teachings of the dieticians, the doctors and the health specialists. But is it well for you to nibble things if you do not know what they are, and what things found on a hike can safely be transferred to the stomach, with or without first being cooked?

In this unit of this series, we present you with four of my favorite "nibblins," with three standard wild "greens," and with two plants that provided the Indians with more or less dependable foods. Any one of these three categories could well be expanded into a considerable volume, so no one should think of these plants as being the only ones that might well be used as food. A majority of these plants may be found anywhere in the United States, and some of them may be found around the world, so the information should be generally useful. Some of the plants may be found at any time of the year, while others are in their most useful stages in spring, summer, or in autumn. In some, one part is edible at one time of the year while another part is edible at another time. There is no time of the year when some of these plants may not be found in the field in an edible form, and few places in the United States where none of them are to be found at some time of the year.

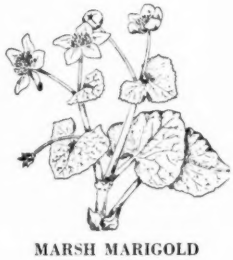
Unfortunately, a few of these, like Indian turnip or jack-in-the-pulpit, cowslip and milkweed, may be considered mildly inedible, or even slightly poisonous under some conditions. Even if they may not be poisonous they may be most unpleasant if eaten under the wrong conditions.

This article, unfortunately, cannot do justice to the food values of many common woody plants. Should the story be extended to them, I would have to include under my "nibblins" black birch buds or inner bark, wintergreen fruits, nuts of many kinds, staghorn sumach fruits, and, of course, the fruits of many shrubs and vines like raspberries, blueberries, blackberries, cranberries, strawberries, and some of the viburnums. I doubt if there is any time in the whole year when I cannot find good "nibblin" stuff on a hike almost anywhere. Most of this costs me nothing, and much of it is superior to items I might have to pay excessive prices to get.

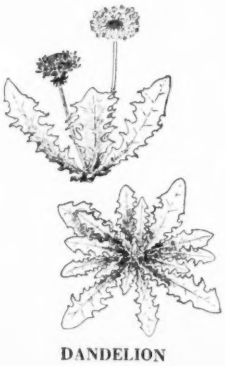
To get back to our wild edible herbs, we should be specific. I can find books that will tell you that one can easily be injured by eating the succulent young shoots

MILKWEED

WINTER CRESS



MARSH MARIGOLD



DANDELION

of common, everyday milkweed. If this is true, I must have a galvanized stomach, or the milkweeds in my neighborhood are kind to me. I eat them with gusto, with pleasure and voraciously every year. I am glad that when I leave the country this spring for a foreign land I will not have to leave before I can have my annual gorge on young milkweed shoots. I confess that, taken alone, they may not be so tasty as I might like, so I usually correct this situation by slitting the shoots with my fingernail lengthwise and inserting between the halves some fresh young leaves of spearmint. The spearmint-milkweed sandwich is hard to beat for downright tastiness, and I have managed to survive it for many years without a single unpleasant reaction. Some of my friends cannot stand it.

The books tell us that, later in the season, one can get a good snack by eating the flower clusters of milkweed. Again, I cannot agree with the books. By the time the plants are in bloom, the tissues have taken on a strong taste, and I am sure that you will find that the shoots are good only until they have become about half-grown. Some of my friends regularly can wild milkweed shoots, just as they would can asparagus. So far as I can see, milkweed is about as good as asparagus if treated in this way. I have a number of times tried the stunt of cooking milkweed flower clusters in pancake batter and can testify that the result is not bad. It is not up to what you get from cooking elderberries in that way, but if you are on a hike, and have no syrup or sugar for your flapjacks, you may welcome the sweetness that comes from the use of milkweed flower clusters. It is quite possible that I am conditioned against milkweed flower clusters because of two experiences, traceable definitely to my gluttony. I once tried to show a group how good such clusters were and without first making a careful examination stuck a cluster in my mouth. A honey bee, hidden in the cluster, came to my attention just in time so that I avoided hurting it. It reciprocated by not hurting me.

Spearmint is good at any time of the year. Even in the dead of winter I have plucked the dead tops from above snowbanks and chewed them. So far as I can see, they are as good as they are when eaten fresh in summer. The plants may be collected in almost any condition, dried, and used as flavoring in a variety of ways. They are to be found widely spread over the country, are hardy and grow well either in the shade or the sun. When I built my home some years ago, I put a few plants in a shaded nook near my garage, and, during the summer months at least, I rarely pass this patch without grabbing a few leaves to nibble on.

SPEARMINT

COMMON CHICKWEED

Another surprisingly good nibbling herb is common, everyday chickweed. It may seem to be rather flat and uninteresting, to be sure, but it is better than some of the tough celery you buy in the market, and it does not cost you a red cent. It will pep up many a plain bread and butter sandwich, if you are on a hike, and feel you would like something in the nature of a little lettuce. Because it is so flat and rather uninteresting, I like to mix in with it a touch of shepherd's purse, sour grass or peppergrass. All three of these are too strong to be taken straight, so they may be made milder by a generous mixture of common chickweed. Tastes vary so greatly that I would not presume to suggest a recipe using these common weeds, so it is up to you to find just the combination that suits your particular palate.

I must confess that, now and then, I have to use my imagination a little to enthuse over a mouthful of these last-mentioned weeds. They are all right for a stunt, maybe, like eating roasted grasshoppers, which are really tasty if you can forget what you are eating, but they really cannot compare with a good meal of Jerusalem artichoke "roots." *There* is a nibbling meal I can recommend without any apology whatever. In fact, there is no other weed mentioned in this article that I think can compare with it, unless it might be black birch buds, or spearmint. But your Jerusalem artichokes are in a class by themselves, and the nice part of them is that you can eat and eat and not worry about your belt line while you are at it. They are as crisp and crunchy as the finest celery hearts. They have a delicate sweetness all their own. They are hardy and easily grown. They will grow on ground not suitable for ordinary agricultural crops, and, in all probability, they do not cost you a cent. In these days of high living costs, those arguments should constitute an almost unbeatable sales talk. All I ask is that each of you try one of these roots some time. Then, you will not need further argument from me, and will join me in singing the praises of this plant. There are orthodox folks who tell you that it is better to cook your Jerusalem artichokes. I do not agree with them. I like them raw, just as I like peas and celery and apples raw. I rather think that you will agree with me if you will give this wild food a try.

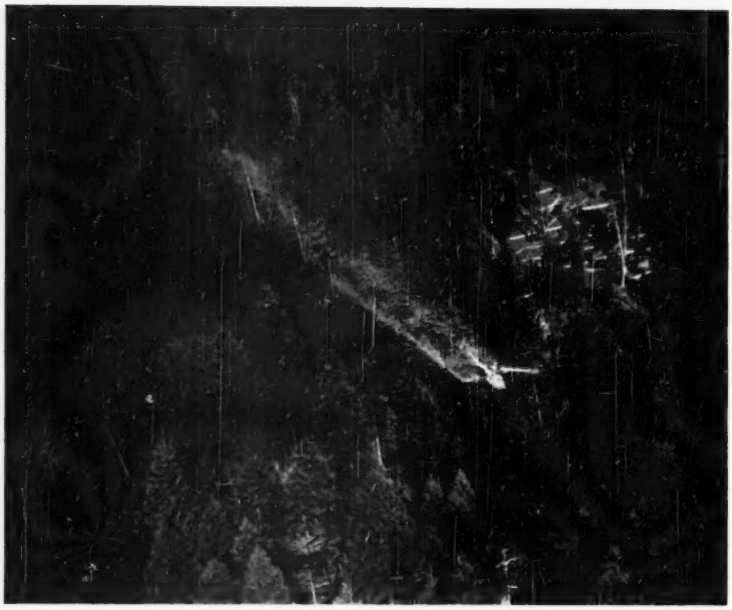
We could give an extended list of common lawn and garden weeds that are good as greens. Certainly, many of them are as good for (Continued on page 194)

COMMON NAME SCIENTIFIC NAME	CATTAIL *Typha latifolia*	JACK-IN-THE-PULPIT INDIAN TURNIP *Arisaema triphyllum*	MARSH MARIGOLD COWSLIP *Caltha palustris*	COMMON CHICKWEED *Stellaria media*
DESCRIPTION	Leaves to over 6 feet long and to 1 inch wide, filled with large, squarish air sacks, sheathing the stem; alternate, with straight unbroken margins, ribbon-shaped and usually more or less stiffly erect. Rootstock is coarse, spongy, horizontal, filled with gleaming white, starchy substances and interlocking with others.	Plant may reach a height of 3 feet, with one or two leaves, each of 3 parts, each of which may be to 7 inches long and to 3 inches wide and with conspicuous netted veins. Leaves and stem are not ordinarily tough and rugged. Underground is a deeply buried, solid, bulb-like base from which roots and leaves arise.	Rather coarse-stemmed plants that reach a height of 2 feet, the stems branching rather freely at the upper extremities, smooth, rich, dark green like the leaves, which are from 2 to 8 inches across, with kidney-shaped blades, rather long petioles, smooth surfaces and conspicuous veins. Lower leaves with longest petioles.	Low, sprawling, rather delicate, pale-green plant with weak stems that bear light-colored hairs in lines, branch rather freely and bear pale-green, opposite leaves that are to 1½ inches long with petioles and blades approximately equal in length, with the lower with the longer petioles. Roots weak.
RELATIONSHIP AND RANGE	Found in marshes through North America, Europe and Asia, with the warmer regions taken over by the related narrow-leaved cattail, in which there is a small, bare section between the staminate and pistillate parts of the fruiting spike, and the leaves are normally narrower, rarely exceeding ½-inch in width.	Found from Nova Scotia to Minnesota and south to North Carolina and Louisiana. Grows usually in deep, rich wood soil, or in accumulations of such material on the sides of gorges or banks. It is closely related to the green dragon, *Arisaema dracontium*, that appears much more common in the mid-West than in the East.	From Newfoundland to South Carolina and west to Alberta and Nebraska, being found in marshes and similar wet spots, frequently at the edge of shrubby areas where the sun may reach them easily. One relative is even more aquatic than this species. This species is native of North America.	Common in waste places in the shade, or in the sun, usually where there is some moisture, as about the foundations of buildings or in other neglected spots. Sometimes in practically pure stands crowding out competitive species, but more likely surviving where these cannot. Naturalized from Europe. Transcontinental.
REPRODUCTION	Flowers borne in compact spikes with the staminate borne above the pistillate. Flowering spikes may be held to a height of 8 feet. Loose, starch-laden stamens appear almost fluffy when mature and are easily knocked off. Pistillate flowers yield fruits that are shed during winter and following spring as parachutes.	Flowers borne within a hooded "pulpit," with usually the flowers in a cluster either staminate or pistillate. The hooded spathe is commonly colored on the inside a rich brown, or it may be merely darker green and streaked. Fruits are scarlet berries appearing after hood is shed, each fruit containing a few seeds.	Flowers appear as startling yellow, shallow cups that are to 1½ inches across and appear in late spring or very early summer, Petals are absent and the petal-like sepals drop off early. Stamens are very numerous and there may be to a dozen or more pistils, each reaching to an inch in length, or less, and bearing many seeds.	Flowers to ⅓-inch across, pale-green but rather conspicuous sepals that are larger than the deeply 2-parted paler or whitish petals, which are 5 but appear to be 10. Stamens 3 to 7, about half the length of the pistil, whose styles are slender and spreading. Seeds flattened, brown, wrinkled and freed from fruit.
HABITS	Plants form clean stands to the exclusion of most other plants. Their interlocking rootstocks form a firm bed over loose mud, and may anchor soil in time of flood and even delay the flow of flood waters. The plants provide shelter for waterfowl and food for muskrats, and are commonly used as blinds by hunters.	Pollinated by beetles and other insects that visit the hood. Seeds are carried by animals and dropped on the ground after being used as food. Flowers appear in late spring or early summer, the fruits in summer or early fall. Fruit or the basal "turnips," if eaten, may cause temporary but severe stinging pain.	The poison contained in the fresh plants is the alkaloid jervine and the glucoside helleborin, both of which are destroyed, either by drying the plant or by cooking it *thoroughly*. The attractive flowers are useless as bouquets since the showy parts drop off soon after the flowers are picked.	At its best in cool weather, so may be found growing vigorously, even in winter, in sheltered spots. Plants break easily when weeded but are quickly replaced by new plants or by new growth. Controlled by some of the common weed sprays, or by iron sulfate at 100 pounds to a barrel of water.
ECONOMIC IMPORTANCE	Young fruits may be eaten as "Cossack asparagus;" the pith of young stems to 1½ feet long are eaten raw, the staminate heads are used as a source of flour, or eaten cooked as pancakes. Leaves are used in calking barrels and boats, twisted as rush bottoms for chairs, and woven as coarse fabrics. Fluffy fruits used as pillow filler.	Baked, boiled or cooked, the turnip loses its unpleasant qualities. It was formerly pounded into a flour, heated and baked, or allowed to stand for some time during which it loses its unpleasant properties. Fresh turnip has been used as an emetic and it should be effective.	Domestic animals may be poisoned by eating the fresh green parts of the plant. Animals eating the plant may be troubled with diarrhea, milk stoppage and general stomach troubles, particularly of the bloating type. Buds may be parboiled in a salt solution and pickled for use as food by man, or the leaves may be used as greens.	Rather delicious if pepped up by mixing with more virile-tasting species. May be eaten raw or cooked, and in Europe is a common green serving as an inferior sort of spinach, but to domestic animals, such as chickens, pigs and the like, it is good grazing just as it grows. May become a persistent pest in some greenhouses.

WINTER CRESS *Barbarea vulgaris*	COMMON MILKWEED *Asclepias syriaca*	SPEARMINT *Mentha spicata*	JERUSALEM ARTICHOKE *Helianthus tuberosa*	DANDELION *Taraxacum officinale*
Somewhat branched, erect herb reaching a height of to 2 feet. Leaves, alternate, at least below; the lower ones to sometimes over 5 inches long with a large terminal section backed by smaller and smaller lateral lobes and a rather long petiole. Conspicuous winter rosettes are formed as shown.	Substantial herbs with single, erect stems arising from trailing rootstocks. Stems commonly branched in upper parts, to 5 feet tall, tough-barked but with brittle interiors. Leaves, opposite, thick, coarse, darker above, with margins commonly curving downward. Petioles short and stocky. Juice milky and sticky.	Slender, erect to sprawling, well-branched plants with square stems that are tough when dried or brittle when slender and thoroughly dried. Height, to 2 feet. Leaves 2¼ inches long, opposite, with conspicuously notched margins and netted veins, with short petioles or with none.	Coarse, very rough plants whose stems branch in the upper areas and reach a height of 12 feet. Leaves are opposite, rough above and downy beneath, coarse, to 8 inches long and 3 inches wide, with shallowly notched margins and conspicuous veins. Horizontal rootstocks bear delicious knobby tubers.	Stemless plants whose flower-stalk or scape may reach a height of to 1½ feet. Leaves are borne in a rosette that may be close to the ground, or, when in competition, may be more or less erect. Leaves to 10 inches long with coarse, backward-pointing marginal teeth, and with long petioles commonly at the base. Perennial.
Common in fields, gardens and waste places in widely distributed areas in North America, but introduced and finally naturalized from Europe. It survives in a variety of soils under a variety of conditions, but the winter rosettes may be the most conspicuous part of the plant when neighboring plants apparently are dead.	Common in dry pastures where they are avoided by cattle and other grazing animals. Sometimes get established at garden borders. Found growing native from New Brunswick to Saskatchewan and south to North Carolina and Kansas. Has potential qualities that might lead to its cultivation sometime.	Widely established in North America but introduced originally from Europe and Asia, growing either in gardens, on waste soil, or in wet spots near streams or other waterways. In some parts of the middle West is found growing under cultivation. Some 30 related species found in North Temperate Zone.	Found from Nova Scotia to Georgia and west to Arkansas and Manitoba growing wild or in cultivation in loose, moist soil or any good garden soil. It is hardy and survives neglect better than many inferior plants of the same environment, and once established may persist in spite of competitive crops.	Introduced and widely established from its native Europe, growing now too commonly on lawns, in gardens, or in waste places. Found in Southern Hemisphere as well as in the Northern Hemisphere. There is a closely related, but usually less common, red-seeded dandelion to be found in the North.
Flowers, a conspicuous bright yellow, of 4 petals, 4 sepals and producing a pod that is 4-angled and reaches a length of 1 inch, and is about 6 times the length of the immediately supporting stem. Flowers are to ⅓-inch across and appear in early summer, or later, depending on the season.	Flowers borne in huge, globular clusters in axils of upper leaves each flower on its own stem. Flowers pale lilac or brownish, with greenish, 5-parted calyxes and with stamens that may be torn loose by visiting bees. Slightly fragrant and rather sweetish if eaten raw. Fruits split lengthwise freeing fluffy seeds.	Flowers with pale-blue to purple corollas with calyx about half the length of the corolla. Flowers borne in whorls near and at ends of the uppermost branches forming slender, rather open spikes, the center one of which is usually the longest. Fruits of four nutlets to each flower.	Flowers borne in the usually open sunflower heads, which are, in this case, to 4 inches across. There are from 10 to 20 conspicuous, notch-tipped, ray flowers, each commonly over an inch long and neutral. The disc flowers bear both stamens and pistils, and produce one-seeded fertile fruits that are somewhat downy.	Flowers bright yellow straps borne in crowded heads, enclosed or supported by an involucre of green, sepal-like bracts. Ends of the corollas finely notched. All flowers bear both stamens and pistils, and, while flowers are insect-visited and produce pollen, pollen is sterile and seeds are produced without fertilization.
Plants starting from seed in late summer develop as rosettes during the fall, and, during short warmer periods of winter, grow remarkably. By early December, or on St. Barbara's Day, the leaves and stems are supposed to be at their best and are then relatively free from the bitterness that develops later.	Has high survival qualities and fortunately, when mature, is bitter and inedible. Mature plants may be seriously poisonous to grazing animals. Young shoots delicious as suggested in the text, but it may be best to avoid eating them as the plants approach mature size. Pods free seeds in fall, or on into the winter.	May be planted from seeds, or by using cuttings, and where grown under cultivation the tops are harvested just after the first flowers begin to appear when the volatile oil content of the plant is at its highest. One acre may yield to 20 lbs. of oil, which is used medicinally to reduce stomach gases.	Flowers appear in September, and the tubers are at their best by late October, when they may be harvested or left through the winter for a spring harvest. Harvesting is usually by simply plowing the plants out. Under cultivation in Europe, the plant is known as Canadian potato and is more popular than here.	Flowers appear from January to January, and fruits may be found at any time of the year, although the most prolific time is in late spring and early summer. Cultivated for use as a drug, 1 acre needs about 3 lbs. of seeds that are planted in drills 1½ feet apart. One acre may yield ½ ton of the crop and the United States uses 65 tons a year.
Normally greens from this plant are too bitter for most persons unless the water has been changed a number of times during the preparatory cooking. Plants that have been thoroughly washed are usually put directly into the boiling water, salted and then eaten soon after the preparation is complete.	Young shoots of real food value. Bark of mature and dried plant contains excellent fiber that may be woven into coarse and rather strong fabrics. Fluffs of seeds were collected in great quantities during the war, and used to fill life belts of aviators. Juice may be made to yield a rubber substitute. Controlled by salting.	Plant makes an excellent sandwich filler when fresh, or may be used in soups, in chewing gum, in mint juleps, or as sauces or jellies popular in cutting the normal greasiness of lamb. Plant may cause a temporary but harmless dermatitis to some people contacting it with a wet skin, or when the plant itself is wet.	The carbohydrate in the tuber is in the form of inulin, good as food for diabetics. It is also used in the production of industrial alcohol. Eaten raw, or cooked like potatoes, the tubers are delicious and a favorite of the writer's. The plant itself provides a coarse forage of some value as food for stock.	Leaves are used commonly as a pot herb and in the production of dandelion wine. Experiments have been conducted seeking rubber in the milky juice. Plants are considered pests in lawns, but they may be eliminated by use of the modern weed sprays, although treatment must be repeated to care for invading plants from outside.

Fighting the Spruce Budworm by Air Attack

By HAROLD OLSON



The hovering helicopter leaves a trail of DDT spray that deals death to spruce budworms.

CONTROL of the spruce budworm is possible. Long a thorn in the side of tree growers, this insect now can be stopped by aerially applied DDT at costs within the realm of economic feasibility. Methods for controlling the budworm were worked out last summer in eastern Oregon.

There, on the Kinzau Pine Mills "Tree Farm" in the Umatilla hills, a large-scale, cooperative experiment finally put the finger on the spruce budworm, an insect that has taken a terrific toll in the nation's timber resources all the way from New England to the Northwest.

Joining hands in the project were the Oregon State Board of Forestry, the U. S. Bureau of Entomology and Plant Quarantine's division of forest insect investigation, the U. S. Forest Service, and private industry, which has a large investment at stake.

In a full-fledged air war rehearsal, manned by top specialists in the forest insect field, theories and formulas evolved in years of budworm control work were put to test. About 4200 acres in twelve separate plots were sprayed with DDT solutions applied by specially equipped, low-flying airplanes. A conventional biplane and a helicopter were employed. Painstaking studies of results followed. The harvest of facts gleaned by entomologists has now been pretty well assayed, and found good for the forests.

Scene of the tests was the western pine region east of the Cascade range, where currently a huge budworm infestation is eating its way through the woods. About one million acres scattered over the Blue Mountain forests, public and private, are under attack by hordes of the defoliating spruce budworms. The insects concentrated on Douglas and white firs. First sighted four years ago, the outbreak has been building up and fanning out each year, and, to date, shows no sign of cresting. A heavy timber kill, starting with this season, is feared.

When aerial surveys disclosed the immense

Entomologist Walter Buckhorn demonstrates the gun that shoots a brass pin over the top of a tree selected as a corner marker. Attached to the pin is a cord, which enables control workers to pull a can of paint charged with dynamite to the top of the tree, where it is exploded, marking the tree with aluminum paint as a guide to fliers.

scope of the infestation, plans were laid to carry out in 1948 a thorough control experiment, bringing into play all information garnered on other budworm fronts in the United States and Canada. State Forester N. S. Rogers assigned his conservation division chief, John B. Woods, Jr., to take charge of administrative detail under the Oregon cooperative forest pest control law. The Bureau of Entomology sent Charles B. Eaton, of the Agricultural Research Center at Beltsville, Maryland, to work out technical phases. The Portland forest insect laboratory of the Bureau assigned Entomologist R. L. Furniss and his entire staff.

For Bureau of Entomology experts the Oregon project was merely another step in their continuing fight to halt the spruce budworm. They drew heavily on findings made in smaller aerial DDT spraying tests, conducted in 1946 and 1947 in New York's Adirondack area. The 1946 operations, carried out in the Saranac Lake region, where spruce budworm infestations were endangering stands of balsam fir and spruce, were conducted in cooperation with the Newton Falls Paper Company, and the Draper Corporation.

The 1947 spraying operations were conducted near Cranberry Lake on state-owned forest land. In both the New York tests planes and equipment used were supplied by the Division of Forest Insect Investigation of the Bureau of Entomology, which maintains a fleet of four N3N's and Steermans once used by the Navy to train fledgling pilots.

For the Oregon operations the spray flying was contracted to a Yakima, Washington, firm experienced in forestry work. Headquarters was set up at Tupper guard station. Then came the Pacific Northwest's 1948 cloudbursts that culminated in the Vanport disaster, and the entire project was threatened.

Plans had to be changed. The helicopter finally flew from a Kinzau Pine Mills logging highway, while the airplane, a Travelair, used a wheatfield airstrip north of the infested forest area. Despite weather handicaps the makeshift bases worked out well.

AMERICAN FOREST PRODUCTS INDUSTRIES PHOTOGRAPH

What the spruce budworm does to a fir bough. This insect is a bud- and needle-eater that has long taken a heavy toll of America's saw timber.

Six of the 350-acre plots were sprayed by the helicopter, and six by the biplane. Three other plots, for comparison control studies, were not sprayed at all. Two different DDT dosages were used, also twice-over with half-dosage. Each plot was corner-marked to guide pilots on their spraying runs. Painted trees—later explained—served as beacons.

Under trees at representative spots entomologists placed cloth trays a yard wide and matching the tree crown's diameter in length. These caught felled caterpillars for tallying and observation by the scientists. When disturbed, budworm larvae tend to drop to the ground on self-spun silk threads. The DDT disturbed them more than a little, and they dropped from treated trees so fast that the undersides of infested evergreens became masses of webs, like attics long neglected.

Later, sample trees were cut down and foliage searched in a check for bugs that might have survived or escaped the insecticide. A fourth of the foliage of each of ten trees on each plot was examined. As this work progressed entomologists began to realize they had met success in spruce budworm control results.

"There was a kill of 98 to 100 per cent," said a sum-

The helicopter is fitted with special equipment with which to dispense the spray. Oregon's Assistant State Forester, John B. Woods, Jr., points to one of the jets, explaining them to Gail Thomas, forest engineer.

mary from the Portland laboratory. "All types of treatment were effective. The one pound DDT in one gallon of oil per acre was almost as good as two pounds in two gallons for the same area, the chief difference being that the stronger dose acted faster. Total kill was very similar. As between helicopter and conventional airplane spraying there was little to choose, both being highly effective. And," the report added, "we worked on a strong and healthy brood, unaffected as yet by natural control factors. The results are all we could possibly hope for; in fact, they are rather astounding."

Some observers reported the Oregon spruce budworm caterpillars seemed to be stronger, tougher and harder to kill than either the hemlock looper or the Douglas fir tussock moth, both of which had previously been control-sprayed aerially in the Pacific Northwest. Yet the budworm, too, succumbed to DDT.

Spraying started on June 20. It had to be done between that date and early July during the principal feeding stage, when the insect is exposed and most vulnerable. By the latter part of the month, field checking of results was well in hand.

A simple but effective method for marking trees to guide pilots on their spraying runs was devised by W. J. Buckhorn, of the Portland insect laboratory. With a sawed-off, 1873, Army-model, Springfield rifle (45-70) he fired a brass harpoon with line attached over the top of the tree to be marked. Factory-wound cord, payed out from a canister clamped to the rifle barrel, trailed the pin over the tree to the ground on the opposite side. Then a "paint bomb," a can of paint with a quarter stick of dynamite inside, was hoisted into the tree top on the string and there detonated from the ground by means of a wire triggering device. The explosion sprayed the beacon tree with bright aluminum paint.

Buckhorn's line-throwing gun worked to perfection, even during special demonstrations obligingly staged for fascinated galleries of foresters, loggers and newspapermen.

A long history of costly spruce budworm raids on American forests led up to this summer's Oregon project. The insect is a bud- and needle-eater of international standing, with a pronounced preference for spruce and fir. Major outbreaks credited to the budworm include the destruction of some 20 million cords of Lake States timber between 1913 and 1926; severe inroads on balsam fir and spruce in New England and Canada, and sporadic attacks on firs and lodgepole pine in the northern Rocky Mountain section.

In the present western infestation young firs, Douglas and white, seem to be the chief sufferers. These are the trees that should provide America's timber crop fifty years from now.

Eggs of the budworm hatch in late July or early August. The tiny caterpillars head for a good hiding place, spin a cocoon and hole up for the winter. They begin to stir when temperatures approach the 60-degree mark in the spring. As their first activity, then, they mine the buds where they cannot be reached with surface poisons. After a month or so the new foliage expands, exposing the caterpillars. Then for about two weeks the budworms' defenses are down. At this time the entomologists have to hit them, and hit them hard.

In early July the greenish-brown, mottled, inch-long caterpillars slow up. Pretty soon they go into the pupal stage, remain dormant ten days to two weeks and emerge as speckled brown moths with one-inch wingspread. Then they are ready to start another generation.

Walla Walla, Washington, residents got a good look at these budworm moths recently when swarms of them invaded that city one warm August night. Moths swarmed around a brightly lighted carnival in such numbers that the management was forced to shut down its ferris wheel and merry-go-round. Downtown restaurants closed for the evening and neon lights on theatre marquees were dimmed. Entomologists say the swarming moths flew in from one of the infested forests in the adjacent Blue Mountain region.

A forest survey was made last summer to determine trends of the infestation and prospects for 1949. It now seems probable that a full-scale insect control project will be undertaken. The State of Oregon already has made $125,000 available as its share in underwriting the cost of such a project. Neither the western pine operators who own the affected "Tree Farms," the U. S. Forest Service, nor the Oregon State Forestry Board are in any mood to let insects kill and waste timber if it can be prevented.

Everyone hopes, of course, that natural control agents, including weather, will reassert themselves, in which case a costly spraying project might not be necessary. Without signs of an upswing in natural control agents, it appears likely that at least some of the areas where infestation is most severe will be aerially treated this June, not only to save fir timber but also to spare forest areas from the extra hazard of snag patches created by the invaders.

The spruce budworm last year had invaded the area west of the Cascade Mountains for what is believed to be the first time, and an infested Douglas fir stand near Springfield, Oregon, is being watched closely by foresters and entomologists.

Meanwhile the Bureau of Entomology is keeping one of its planes alerted for aerial surveys of pine forests in eastern Washington and Oregon, where the budworm infestation area is thought to total at least 1,500,000 acres.

The salient point is that there is now, for the first time, a tested tool in Paul Bunyan's forest protection arsenal that can be used against the budworm wherever it appears. The Bureau (Continued on page 194)

Outdoor Classroom

By DOROTHY TOOKER

Many of the 10,000 persons who visited the Nature Center last year came as members of school, Scout, Nature or garden groups. The most popular trip is along the Nature Trail, a three-quarter-mile loop that passes Mead Lake and other featured spots. Director Charles E. Mohr briefs a school class.

AT THE intersection of Riversville Road and John Street, in the rolling hills behind Greenwich, Connecticut, an inconspicuous road climbs off on the bias. It looks like just any country drive, bordered by common roadside flowers and low trees, but the visitor who follows it soon notices a sign reading: THIS IS A SANCTUARY. PLEASE DO NOT TAKE WILDFLOWERS OR BRANCHES. A short distance beyond he comes to a large parking space and another sign telling him that automobiles are allowed no farther. Close by, in the shade of ancient trees, is a comfortable colonial house, and across the road is an old red barn, now used as a museum. Here is the Audubon Nature Center, 408 acres of Nature-in-the-raw, and the museum, which serves also as library, headquarters, and administration building.

The casual visitor who makes a bee line for the inside of the museum finds neither cages nor stuffed animals there. Posted on the walls and arranged on numerous large tables are many exhibits as informative as they are interesting. There is, for instance, one section devoted to the types of wood found on the preserve. Each is illustrated by a section of tree trunk showing the bark; beside it is a vertical cross section to demonstrate how the cut wood appears, and small labels telling a few facts about each tree and the uses to which its wood is put. Other displays vary with the time of year and may include such things as birds' nests, all neatly labeled with an accompanying colored picture of the bird, or the fall fruits that particularly satisfy certain birds. The wall exhibits, large colored drawings, are of special interest, and depict such things as the rain cycle—the life of a drop of water from the moment it leaves a cloud, through its career on earth, until it once again becomes part of a cloud.

Although one may suspect that delightful classes in natural history are held here, the visitor will find that the entire Center is one large outdoor classroom and laboratory. For here Nature itself is studied—not what someone has written in a textbook. For ten weeks each summer educational field-sessions are conducted for small groups of adults chosen because of their leadership in organizations to which they pass on the instruction received at the Center. Because of the limited capacity of the residence, the number of students is held to a minimum. Most of them are youth leaders, teachers, or members of garden clubs. One two-week course is designed to train Nature and woodcraft leaders for summer camps. Others are concerned with the fundamental problems we face in accomplishing the wise use of our natural resources. Teachers discover how better to present this vital subject in the classroom. Garden club conservation

The role of vegetation in preventing erosion is here being demonstrated with "run-off boxes" constructed on a 1/10,000 of an acre scale. A group of teachers in one of the summer conservation courses look on.

Nearly two hundred neatly labeled, often illustrated, wooden signs interpret the plants and the animal life to be seen along the Nature Trail, or explain processes that are taking place.

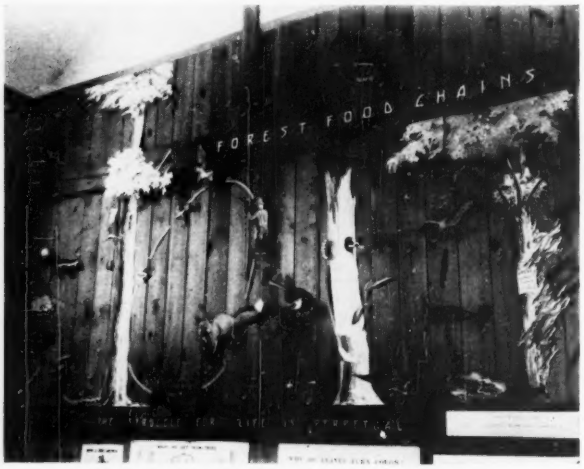
chairmen approach the subject in terms of civic projects in their own communities. A remarkable series of field trips, demonstrations, lectures and film discussions give the students a rich background of experience upon which to build their individual projects.

A staff of experts, under Director Charles E. Mohr, conducts the summer program. Since it is a year-round Center, Mr. Mohr and a skeleton staff live on the Sanctuary. Even in mid-winter you will find activity. But from the time the first green of spring begins to show, until after the last crisp autumn leaves have blown away, there is a daily procession of school classes, scout, civic, and garden club groups, taken on planned tours of interesting sections of the Sanctuary. Many of the children who come with school classes reappear on week ends as members of family groups, and often serve as guides. Visitors may take advantage of the picnic ground with its stone fireplaces, and the many miles of marked trails.

Whether you prefer woods, swamp, rocks, or lake, there is a pleasant trail for you to follow. Outside the museum door is a large colored map of the Center, showing paths with such names as Bayberry Lane, Orchard Road, Maple Swamp Loop, and Old Pasture Trail. The Clovis Trail is named for Mr. and Mrs. H. Hall Clovis, who donated this property to the National Audubon Society in 1942. The Nature Trail, three-quarters of a mile long, is recommended to newcomers, as it begins at headquarters and includes many of the high spots. Going down the path, past the home of the director, the trail leads through an old orchard where deer often are seen. Here, too, on a sunny day, are myriad butterflies, softly fluttering over the high grass and flowers. In midsummer the swallowtails are especially common. As fall approaches the chestnut and black monarch butterflies take advantage of every clump of wild purple asters.

Continue on into the woods. The trail signs, often so close together that several may be seen at once, clearly point the way, and call attention to many features that might easily be passed without notice. Markers tell how trees grow, their peculiarities, and their relation to other plants in the vicinity. The three varied-shaped leaves of the sassafras are pointed out and pictured so that the visitor may compare the illustration with the foliage of the tree that it identifies. Nearby, another placard advises the hiker to pause for a moment and look high into the branches of a tree where gray squirrels have built their home. It is a large cluster of dead twigs and leaves and is known as a "dray."

Most clever of all are the signs that ask questions about the surroundings. Before the answer can be checked, the board on which the words are painted must be pivoted to expose the correct answer, on the reverse side.



Clever cut-out mural exhibits interpret the remarkable inter-relationships that exist in Nature. Other exhibits of this type show plant succession, adaptations of animals to winter conditions, the life of a pond, and other facts.

At other places, signposts stand knee-deep in foliage, and the lettering at the top describes the plant and its uses. Often, colored pictures of both flowers and fruit are included, and sometimes a short history of the former use of particular areas is given.

Located at intervals along the way are blocks of salt. Your chance to surprise a timid deer partaking of the treat is best in late afternoon. There are several places, all clearly marked, where deer-tracks often are seen. The watchful observer may also find the tiny footprints of other animals, for foxes, minks, raccoons, opossums, woodchucks, rabbits and many other mammals make their homes in the Sanctuary.

The Nature Trail takes one to Mead Lake, a 5-acre pond. Ferns and liverworts grow below the stone dam, where a mill stood a century ago. Cattails, water lilies, and pickerel-weed flourish in the shallower water, and there, too, are found many of the cold blooded residents of the Center. Judging from the variety of tone quality, pitch, and resonance, there must be enough varieties of frogs and toads in the spring chorus to drive a herpetologist into ecstasy. Not only do frogs abound, but numerous toads, salamanders, and seven species of turtles are their close neighbors. Near the lake the cinnamon, interrupted, and ostrich ferns send up tall, green plumes, and in the damp ground grow skunk cabbages and other plants that like to keep their feet in a wet habitat.

Along the trails one constantly sees signs of normal growth and destruction—here, a tree uprooted; there, another being parasitized by fungus. This is the way Nature, left to herself, treats an area, and the purpose of the Audubon Society is to allow Nature to care for the Center in her own way. As time passes, a succession of plants make their appearance. On rocks deposited or bared by the last glaciation grow lichens of many types; later to be covered by mosses, ferns, and flowering plants. Fallen trees show a more rapid succession. First come the fungi, perhaps several kinds, some tiny, pale mushrooms, others like small yellow fingers. Later, lichens and tiny mosses sprout, and in a few years the old log will be a soft, plush-like, mossy mound with a scattering of wood ferns.

Similarly, marshy land is slowly filled in, and fields grow up to vines and shrubs. Invasions by birch and aspen, ash and maple characterize the early stages of a gradual transition into forest. Beech and sugar maple, sometimes hemlock or oak and hickory, may eventually dominate the forest, in its final or "climax" stages. One of the mural exhibits at the headquarters illustrates this natural transition from field to forest, and a leaflet describes it and interprets the exhibit.

Part of the Nature Center is a wildflower sanctuary, the Fairchild Garden. It was an abandoned farm when Benjamin T. Fairchild bought it in 1895. He first planned to stock his property with game and fish, but soon became so interested in the local flora that he abandoned his propagation program. With the help of Russell Jones, his assistant, he set out to collect every plant native to the state. Because of the varied terrain most wild plants were easily naturalized—a place for each being found as nearly as possible like the location where it was discovered. At the time of Mr. Fairchild's death there was much concern over the fate of his garden. But in 1945, through the efforts of Mrs. Elon Huntingdon Hooker, and generous assistance from a number of garden clubs and Audubon members, the 127-acre tract was secured for the National Audubon Society. A full-time member of the Nature Center staff, botanist Leonard J. Bradley, conducts guided tours of the Garden and is responsible for its maintenance.

With the changing seasons different sections of the garden come into prominence. The rocky ledges display the early spring flowers—trilliums, lady's slippers, clintonias, and the like. Marigold Meadow flames pure gold, and later the cowslips are replaced by purple loosestrife and that butterfly magnet, Joe-pye weed. With autumn the full beauty of goldenrod contrasted with purple asters bursts into being, and as the days shorten, fluffy old man's beard is white against the blue October sky. Even after the leaves have gone, ripened seeds and berries are displayed for all the little creatures who are still rushing to prepare for winter.

Highlighting the fall season is the southbound hawk migration. On cool, windy days in late September and through most of October there are often such aerial processions of buteos, accipiters, falcons, marsh hawks, ospreys, and bald eagles that bird-conscious visitors stand for hours just outside the museum.

Nearby, on the same open hilltop, an astonishing concentration of fringed gentians brings to brilliant conclusion the year's floral parade. Detailed botanical notes kept at the Center have made possible the publication of an ingenious calendar of blooming dates. It is cleverly titled, "The Flowers that Bloom in the Spring." Recent additions to the list include summer and fall flowers, also, providing a calendar for some 250 species.

Except when heavy snows make it virtually impossible, a walk at the Audubon Nature Center is always a joy. There are so many things there to see, and hear, and learn from Nature herself, a great teacher.

Fragrant Fern

By ROBERT THOMAS MOORE

The birch has won and lost her gold,
The fir still green from head to toe,
Salutes as friend the biting cold,
When birches cringe before the snow.

Gold never wins a single friend
Worth keeping after old leaves burn,
But chlorophyll holds to the end
The three-year link with Fragrant Fern.

Her green leaves wave from ice-cold cliff
Trusting ally, dear chlorophyll,
While atomed armies, brown and stiff,
Of other ferns succumb to chill.

As We See It

Sugar Pines or Saw Logs

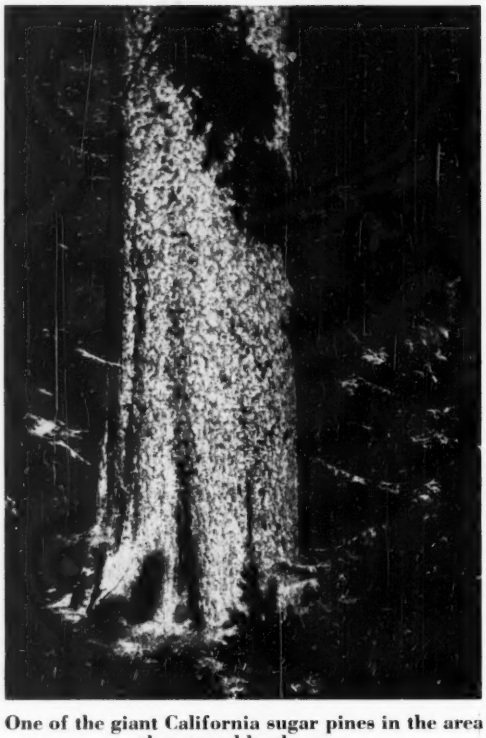
TIME is rapidly running out. The steel fingers of the logging railroad are reaching out to grasp the giant sequoias, and, even more important, the incomparable sugar pines of Toulumne and Calaveras counties in California. If these are to be saved—and they are only a small percentage of the sugar pines of California, and a tinier percent of the State's timber resources—action must be taken *now*.

During the war years the first flame of interest in the preservation of these trees was lit by Mrs. C. N. Edge of the Emergency Conservation Committee. This fire was kept burning, but only feebly, due to preoccupation with the concerns of a world war. And relative inaccessibility, so far as economic lumbering was concerned, also operated to stay the axe. Now inflated timber prices make feasible a logging operation by the mid-West lumbering concern that owns the area. Cutting will start this spring. The logging railroad has less than two miles to go to reach the crucial units.

All that is sought is to preserve, at the most, five thousand acres of the finest part of the greatest coniferous forest in California—five thousand acres of incomparable scenic and recreational value out of the remaining eight million acres of California's virgin forest. Within this area is the South Calaveras Grove of Big Trees, which cannot be lumbered economically, and the superlative sugar pines, including the giant of them all, eight and nine-tenths feet in diameter. Their preservation in a park would be a tourist attraction and source of revenue forever; felled, these trees would be just some more board feet of lumber.

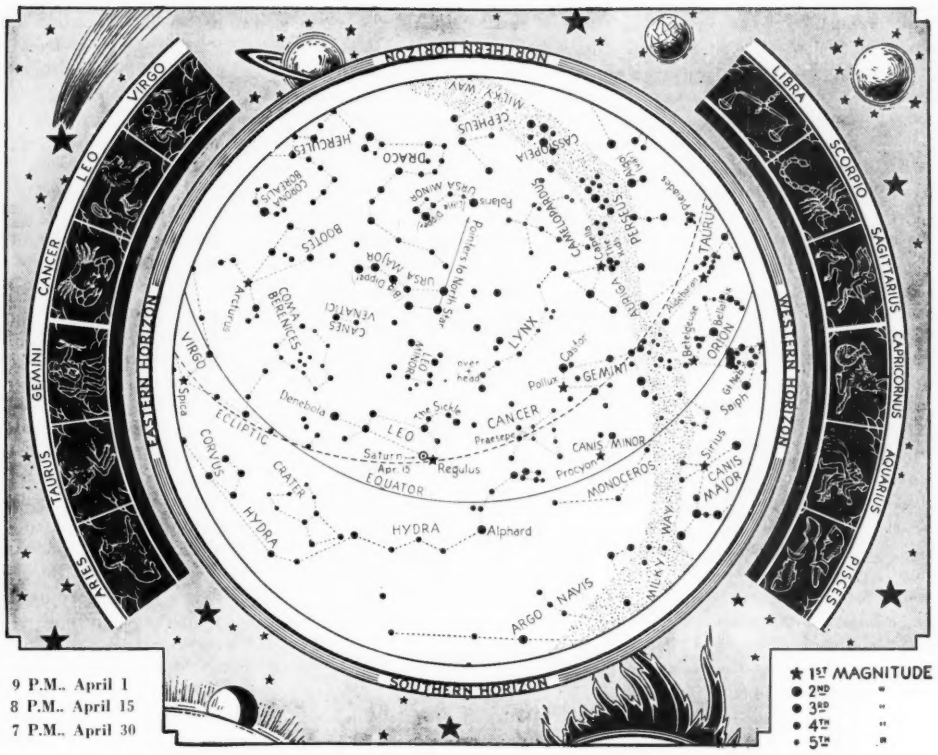
Conservation groups, both in California and nationally, have rallied to the defense of these trees—but, for the most part, tardily. However, the last ditch effort is now being channeled through the California War Memorial Park Association, a voluntary group of a thousand aroused Californians under the chairmanship of John B. Elliott. Headquarters of the Association is Suite 914 Spring Arcade Building, Los Angeles 13, California. No membership dues are sought; no contributions, large or small. Time is too short.

Instead, the Association is taking what seems to be the most logical course to an emergency solution to the problem. California law provides for the establishment of parks and beaches as reservations by acquisitional funds appropriated by the State and matched, dollar for dollar, by private contribution. Five million dollars were appropriated for purchase of inland park areas on this basis. Four million dollars remain unexpended in the fund. In the existing emergency, the War Memorial Park Association is asking the Legislature, which convened in early March, to designate an amount from this fund for the outright acquisition of the Calaveras units, either through a reasonable agreement with the owners or through condemnation. This seems not only a proper but an essential request.



One of the giant California sugar pines in the area threatened by the axe.

In support of this approach, the Association has gotten an amazing response from Californians in public and private life. Their written testimony of support should be enough to convince any legislature. Veterans' organizations, labor groups and civic organizations are lending their support. There is no doubt that Californians are truly aroused, and this is an emergency that, under the circumstances, must be met by Californians. Yet, we feel, they are acting in the interest of all of us, and we should be appreciative. We may also be helpful if we will let Governor Earl Warren, State Capitol, Sacramento 14, California, know that we will appreciate everything he can do to save these great trees for us all.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Moon in Total Eclipse

By ISABEL M. LEWIS

On April 13, Greenwich Civil Time, and on the evening of April 12 in the United States, there will be a fine total eclipse of the moon, visible in North and South America, Europe and Africa, and the Arctic and Antarctic regions.

A total eclipse of the moon is visible everywhere on the surface of the earth where the moon is above the horizon while it is within the shadow of the earth. A total eclipse of the sun, on the other hand, is visible only to those who are located within a narrow belt on the earth's surface, never more than 165 miles wide and usually much less, and about 5900 miles long. There are actually more eclipses of the sun than there are of the moon, but lunar eclipses are seen by more people because they are visible from a far greater part of the earth's surface.

When one has the Greenwich Civil Times at which the various phases of a lunar eclipse begin, one need apply only the required number of hours, in the usual way, to find the corresponding Standard Time at the place where the eclipse is being observed. Thus it is found, by subtracting five hours from the Greenwich Civil Time of that event, that the time of first contact of the moon with the earth's shadow will occur on April 12, 9:28 P.M., Eastern Standard Time. At a place keeping Central Standard Time the same phase of the eclipse will begin at 8:28 P.M., on April 12. The moon passes deeper and deeper into the shadow of the earth until, at 10:28 P.M., Eastern Standard Time, it is totally within it. This is the time of beginning of the total phase of the eclipse. The moon remains totally immersed in the shadow of the earth until 11:54 P.M., Eastern Time, when the total phase of the eclipse is ended. The moon then is seen to emerge gradually from the shadow until, at 12:54 A.M., April 13, last contact with the shadow

takes place. To find the corresponding times of the same phenomena on the Pacific Coast, three hours are subtracted, respectively, from the above Eastern Standard Time.

The longest possible duration of a total eclipse of the sun is seven and one-half minutes. A duration of more than seven minutes is a rare occurrence, and the average duration is less than half as long. A total eclipse of the moon, however, may last for one hour and forty-four minutes. This will occur when the moon passes centrally through the earth's shadow. The length of the cone-shaped shadow of the earth, measured from the plane passing through the earth's center to the vertex of the cone, is about 859,000 miles. It varies several thousand miles in length since the distance of the earth from the moon varies in different parts of its orbit. At the average distance of the moon, which is about 239,000 miles, the diameter of the earth's shadow is about 5700 miles. For the total lunar eclipse that occurs this month we find that the length of the earth's shadow is about 856,700 miles. The distance of the moon from the earth's center at time of the eclipse will be about 222,800 miles and the width of the earth's shadow at the distance of the moon, 5865 miles. Generally the moon does not pass centrally through the earth's shadow. It may, in fact, barely dip into it, and then the duration of the total phase will be very short. In this April eclipse the moon dips deeply into the shadow, and the duration of the total phase of the eclipse will be one hour and twenty-six minutes.

At the time of the beginning of the partial phase of the eclipse, when the moon has first contact with the earth's shadow, the moon is in the zenith in latitude 8 degrees south and longitude 37½ degrees west. At that time the circle on the earth's surface along which the moon is either rising or setting passes through Baffin Island, Greenland, Russia, to the east of the Black Sea, Arabia, the Indian Ocean, Antarctic regions, the Pacific Ocean and the northwestern part of North America. At time of last contact of the moon with the earth's shadow the moon will be in the zenith in latitude 9 degrees south and about 87½ degrees west. The circle on the earth's surface along which the moon is then rising or setting passes from the north polar regions and Greenland to the North Atlantic, along the western coast of Europe to the equatorial bulge of Africa and the south Atlantic, and thence to the Antarctic regions, Pacific Ocean and Arctic regions. The eclipse of the moon in the earth's shadow has been visible not only from half of the earth's surface, but also from additional regions carried into view of the moon by the rotation of the earth from west to east during the nearly three and a half hours that the moon has been passing through the shadow of the earth.

It is well known that the moon is illuminated, while completely in the shadow of the earth, by light from the sun shining through the atmosphere of the earth along the sunrise and sunset portions of the earth's surface. Light passing through this atmospheric ring surrounding the earth, where the sun is in the horizon, is refracted into the earth's cone of shadow and illuminates the lunar surface with a reddish or coppery-tinged light. The regions from which this light comes, along which the sun is then rising or setting, or, rather, the condition of the atmosphere above, determines how bright the moon will appear during the time it is in the earth's shadow. Regions on the earth where the sun is rising or setting at the time will brilliantly reflect sunlight into the shadow-cone of the earth, if the skies are clear there, but will reflect no light if dense clouds obstruct its passage. How bright the moon appears during the total eclipse will depend, then, upon atmospheric conditions in the Arctic and Antarctic regions, parts of the Pacific and Atlantic Oceans, west Equatorial Africa, eastern Europe and northwestern North America. In some total lunar eclipses the moon has been brightly illuminated with this weird coppery light, while in others the moon has been only faintly illuminated, or nearly invisible.

Total lunar eclipses are of small scientific value and interest compared with the valuable results of observations of total solar eclipses. It is possible to make one scientific observation of considerable interest, however, in connection with total lunar eclipses. This has to do with the temperature range on the surface of the moon, and how great and how rapid is the drop in temperature during the few hours that the sun's rays are shut off from the lunar surface while it is passing through the earth's shadow. It has been found that the temperature on the moon's surface at the time it is receiving the most heat from the sun is 275 degrees Fahr., while during the three hours or so of eclipse, partial and total, in the shadow of the earth the temperature drops to 179 degrees below zero. This is what might be expected from a study of the surface features of this (Continued on page 196)

Battle Royal

By JOHN GALLINARI WHIDDING

See how the rising moon dims all the light
  Of waiting stars, who genuflect with care
Against her coming, wonderfully white,
Up the broad purple carpet of the night.

High on her silver throne, she rules as one
  Who brooks no compromising of her right—
Only to lift her gleaming train and run
Down the gray stairs before the vaunting sun.

So turns the world, and while the regal pair,
  By day and night and politics undone,
Usurp the high dominions broad and fair,
Some by the one, some by the other swear.

Guarding Wildlife

"Guarding Our Wildlife Resources" is the fifth attractive booklet in the Conservation in Action series being brought out by the U. S. Fish and Wildlife Service. It is a 46-page publication, profusely illustrated and prepared by Rachel L. Carson. Copies are available from the Superintendent of Documents, Washington 25, D. C., for thirty cents.

On the first page of this attractive publication we read:

"This is the Story of the Wildlife Resources of America, of their place in our history, and their value in our modern life. It is the story of the forces that threaten to destroy them, and the efforts that we must make, as individual nations and as a community of nations, to preserve them."

"The Western Hemisphere has a relatively short history of the exploitation of its natural resources by man. This history, though short, contains many chapters of reckless waste and appalling destruction. Entire species of animals have been exterminated, or reduced to so small a remnant that their survival is doubtful. Forests have been despoiled by uncontrolled and excessive cutting of lumber, grasslands have been destroyed by overgrazing. These and other practices have afflicted us with all the evils of soil erosion, floods, destruction of agricultural lands, and loss of wildlife habitats."

Under "Migratory Birds—A Hemisphere Resource" these groups are discussed, necessarily briefly, since about one-half of the space is devoted to illustrations. Here the treaties with Canada and Mexico are cited, bird-banding is discussed, and the cooperative assistance of sportsmen's organizations in restoration programs receives attention.

Under another heading, "Saving Endangered Species," are brief references to five or six species that are undeniably extinct, and to the remnant of the trumpeter swan still surviving, and the pitifully rare whooping crane, now reduced to two or three dozens—resulting, of course, from pursuit by gunners, the same cause that has been the principal reason underlying extinction or serious reduction of those species still precariously clinging to existence. It is under the heading "Cooperation in Wildlife Restoration," that we find what evidently is intended as the meat of the volume. The first two paragraphs may be quoted.

"The wildlife resources belong to all the people; to conserve them successfully the landowners and the local and Federal governments, through their various conservation agencies, must coordinate their efforts in a program with clearly defined goals. In the United States, such cooperation is now achieving excellent results in practical conservation.

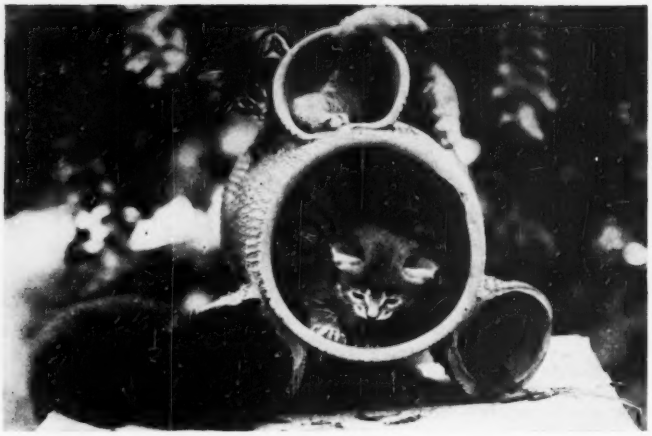
"In 1937, the Congress of the United States adopted legislation known as the Federal Aid in Wildlife Restoration Act, making possible active conservation programs in all of the States, and in Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Several hundred cooperative projects are now under way, including surveys and investigations, acquisition of land, and development of wildlife habitats."

We are disappointed to find no reference to the important surveys and researches carried on by the Biological Survey, whose administration made possible The Lacey Act, and the treaties with Canada and Mexico, and the acts growing from them from 1913 to the time it was merged with the Bureau of Fisheries in 1940. In this report we cannot find this Bureau mentioned by name, although in one place it is called "a predecessor agency." Yet the data gathered by this "agency" made possible the formulation and adoption not only of the international treaties, but the creation of most of the great system of refuges now administered by the Service.

To some of us the most disquieting statement in this important report is the concluding paragraph on page 18, and the final statement in the part preceding the section on fisheries. Referring to cooperation in the restoration of wildlife by means of Federal aid to the States, it says: "This entire program derives its principal financial support from the Federal tax on sporting arms and ammunition. Through this tax, which is set aside for wildlife conservation, the 12 million hunters in the United States contribute to the restoration of game birds and mammals."

This seems to us to constitute a most deplorable state of affairs. How a ten percent tax on guns and ammunition, which are chiefly responsible for the acute need for protection of the diminishing stocks of game that are still pursued by an ever-increasing number of hunters, can be expected to restore these stocks to an adequate supply, is so lacking in logic that we cannot see how it can be relied on by reasonable beings. We have long awaited a convincing explanation.

This criticism is not a reflection on the author. She has written a number of very commendable reports and articles on fishery subjects, but she is not old enough to be aware of the danger of accomplishments by hunter organizations to control by law the taking of wildlife resources "which belong to all the people." Such organizations, in the past, have persistently attempted to outlaw the Migratory Bird Treaty and its regulations, and even now are seeking to establish hunting grounds on our refuges, mostly established as inviolate sanctuaries. Unfortunately, too few are aware of the long struggle that has been necessary to prevent all our waterfowl refuges from becoming slaughter grounds, or can visualize the dangers should any concession to the killers be allowed. E.A.P.



Note how the background detracts from the kitten picture and is unobtrusive in the dog photograph. The focus of the dog's eyes is perfect.

Camera Trails

By EDNA HOFFMAN EVANS

WHEN you set out to take an animal's picture, you have a job on your hands.

Nearly all experienced Nature photographers will agree that pictures of wild animals are the hardest of all to make. Whether the subject is as small as a meadow mouse or as big as a mountain lion, common as a chipmunk or elusive as an antelope, the photographer has his troubles when he tries to get its picture. That is why good wild mammal photographs are much less frequently seen than good wild bird pictures.

The lives of wild animals are not geared to the techniques and requirements of photography. In fact, the animal that would obligingly sit still and pose could not do so and survive long in a realistic world of hungry neighbors.

But it is not only the wildness of the animal, or the ever-present threat of hungry neighbors, that makes animal photography difficult. Pictures of domestic animals present plenty of problems, too. But at least you do not have to photograph your pet dog from a cleverly constructed blind, creep up on your cat with all the skill of a hunting Indian, and stalk a couple of cows or a horse as you would a herd of deer.

Patience is the keynote to almost every picture. If you do not have patience, do not try to take animal pictures, whether they be of wild subjects or tame ones. If you do not have patience, do not try bird photography, or flower photography—or any other kind of Nature photography. In fact, if you did not have a good supply of patience, plus perseverance, plus the virus from whatever "bug" it is that bites all amateur photographers, you probably would not have taken up the hobby, anyhow.

The most satisfactory model was the ranch burro.

But the subject this month is not patience. Instead, it is how to get good pictures of our better known pets and domestic animals—dogs, cats, and horses, to be specific.

A dog is an obliging creature. Since he is the oldest of our domesticated animals, he has been around us and our homes for a long, long time. He has shared our joys and our sorrows, fasted with us during lean years and feasted with us during fat ones. He has been subject to our whims and humors since the days when we lived in caves and hunted with stone axes, instead of with funny black boxes fitted with lenses. He wants to please us now, as he did then, even when we ask him to pose for us.

But when you ask a dog to pose, do not talk too much, do not fuss at him, or confuse him with too many words of praise, censure or command. If you do this, his ears will soon droop, his tail will be wagless, and he will become an abject picture of canine bewilderment. Either that, or else he will get jumpy, nervous, and much too excited for good photography. Such techniques are not good for the photographer's disposition and nerves, either.

The best technique, with dogs as with other animals, is to work quietly. Get your paraphernalia in place beforehand, then say and do as little as possible to excite or confuse your subject.

Dogs can be posed in a variety of ways, depending on the breed and type of picture desired. Informal poses are best, of course, unless the picture is to be put to some use wherein technical points of the dog's anatomy are to be stressed.

Theories as to the proper dog-photographing techniques vary. Some dog specialists say, "Be sure the dog's mouth is closed—his facial expression is much better that way." Yet all of us have seen good pictures of dogs with their mouths open. It all depends on what you want. Other recommendations for dog photography include the use of high shutter speeds to stop any sudden movement—high in this case means 1/100 second or better—care in noting the effects of light on the dog's coat, and the use of a background that provides contrast without confusion.

If the dog is your own, you can operate on a friendly basis of mutual understanding. Choose a place where he can pose comfortably—one that is not too shaky and insecure so he is worried about his footing. My dog, Bonnie, is posed outdoors on a card table top. The camera was on a level with her chest. Other shots, aimed down at her when she was standing or lying on the ground, were not nearly as effective.

In taking animal pictures, always remember to focus on the eyes. Bonnie, a member of the Sheltie (Shetland Sheepdog) breed, has a long nose, but it is her eyes that tell the story. Unless you wish to crop for some specific purpose, say for a head shot, be sure to get all the animal in the picture—all four feet, ear tips, and tail. The advice in this paragraph—focus on eyes, and no cropping—applies to all animal photographs, wild or tame, dangerous or domesticated.

Cats, now, pose different problems. Or rather, compared to dogs, cats will not pose at all. Cats have been domesticated for a long time, too,—that is, they have tolerated us humans for centuries. But they never have accepted us as dogs have. Cats do best what pleases them; dogs do their best to please us.

One photographer who specializes in cat pictures has a three-word formula for success: "Patience, catnip, cream." Patience is always necessary. Catnip gives an alert look, when not used in very large doses. Cream is bait, and, by judicious use of it, Pussy can be coaxed into many interesting and photogenic attitudes.

Personally, I prefer dogs to cats. Nonetheless, I cannot resist the appeal of a fuzzy, wide-eyed, roly-poly, innocent-looking kitten—even though I know said kitten may soon be dining on as many of the neighborhood songbirds as his skill and agility will permit him to catch. Thus, when the family cat had kittens, I welcomed them as camera subjects.

The results, as shown here, can be improved—and will be, I hope, come another batch of kittens. The kitten picture is confusing, and is presented to show the effect of an improper background. At the time, I was so busy trying to keep the kittens from climbing from the fancy flower pot and scattering to the four winds (yes, there were four kittens) that I did not give enough care to the background. Yet Bonnie's picture was shot at approximately the same spot in the back yard that the kittens' was. Note the difference in the way the background blends in one and confuses in the other.

Time after time I have tried to photograph a cat yawning. Once I almost did, and the yawn is evident even though it is not quite in focus. A shade more luck and I would have had it. Time and again I have tried to get Mrs. Cat's picture when she is carrying one of her kittens by the scruff of its neck. I get everything in order, with the camera focused and ready to shoot. But every time she foils me—she refuses to budge, goes off in a different direction, or streaks past the crucial spot before I can even get thumb on trigger.

The new Kodak Reflex II Camera, restyled for additional eye-appeal.

Because cats do move so fast, action pictures of them should be taken at a shutter speed of not less than 1/200 second. When Puss is relaxed or snoozing, the speed can be cut to 1/50 or 1/100. As for film—and this holds true for all animal photography — panchromatic is best for coats in gray, tawny, tiger or brown shades. Verichrome or Plenachrome film and subdued light are better for white coats.

Like the dog, the horse is an obliging creature. But, like all animals, the horse can get camera shy and temperamental. Just last week I tried to photograph a pair of ribbon-winning Arizona colts. They were unconcerned as could be until their owners tried to pose them—and then would either colt deign to look toward the camera? Certainly not. We waited, we whistled, we made strange noises, we commanded and we pleaded. But ears stayed down and heads remained averted. Finally, I took a picture and the noise of the shutter did the trick. Both were instantly alert—ears erect and heads turned inquiringly. But by the time I was ready to shoot again, they both had lost interest. The most satisfactory model was the ranch burro. He munched his hay and wagged his ears, just as though having his picture taken was an everyday occurrence.

Truly, animals are interesting, engaging, exasperating camera subjects.

Mail Bag

And now for a few random notes from the mail bag; personal, first, and then business.

Roger T. Jones of Georgetown, Ky., writes in response to the January section that he, too, is a museum photography

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EDIBLE WEEDS

(Continued from page 179)

this purpose as some of the spinach you find in the markets. To the dandelions and winter cress we have illustrated, I would add pussley—more properly purslane—and chicory and a few others. Dandelions, winter cress, and chicory can be much too strong for my taste once they have matured, but by the time purslane is too old it has practically dropped to pieces anyway. Common purslane is frequently sold in the markets of western Europe, of Mexico, and of other parts of the world, but we do not seem to have learned to appreciate it, possibly because of our resentment of its invasion of our gardens at a time when we feel we have done just about enough weeding for the year.

Winter cress is found in our gardens in early spring when we begin our gardening operations for the year. I have often wondered why so many persons pulled up the rosettes of this plant and threw them away to make space for a row of spinach, which would require considerable attention to reach maturity. Winter cress, to me, is just a bit too strong, but I can understand why others might well like it when I see what so many people eat.

Marsh marigold or cowslip is, of course, a standard spring green in many parts of the country. Certainly, it looks as though it should be edible, and in some spots it requires no effort to get a substantial quantity in a short time with a minimum of effort. However, I rather think that there is some danger in eating the plants unless they are well cooked, and the first water drained off and replaced with fresh water. Cattle, after eating fresh cowslips, have been known to be troubled with diarrhea, stoppage of milk and bloating, and some of the books advise against eating the plants unless they are thoroughly cooked. The same conservative books, however, do not hesitate to praise the tastiness of cowslip buds that have been parboiled in a salt solution and pickled, as are capers and cucumber pickles. The details of the poisonous properties of this plant are given in the chart section of this article.

Folklore has it that the young shoots of skoke, or inkberry, or pokeweed are delicious. I will not argue with this statement because I have eaten them after they have been cooked like asparagus. The evidence regarding the poisonous properties of this plant is too reliable to be ignored, however, and all interested in it should be warned that they eat well-developed plant tissues at their own risk. The roots and berries, and even the matured stems, may cause severe trouble with the alimentary and respiratory system if they are eaten even after having been cooked. Even death is reported to have been caused by eating this plant. Under these circumstances, I do not feel like taking any chances, particularly when there are safer, equally delicious plants available practically everywhere in greater abundance.

In earlier educational features, we have given some consideration to such basic food plants, which grow wild and in abundance, as cattails and Indian turnip or jack-in-the-pulpit. The flour made from the staminate flower clusters at the very tip-top of the cattail has been collected and stored by natives of many lands. It is still good and worth trying, if you have never had the experience. Mixed with a little ordinary flour, it makes good pancakes. The underground, or, rather, underwater rootstocks are packed with a white starch in the fall and winter. This is appreciated by muskrats, even though it is unavailable to ducks, and unappreciated by most of us. The amount of starch an acre of marshland might yield is probably considerable, but the task of removing it and preparing it for use is too great to lend favor to its general use, particularly when the staminate flowers may yield a satisfactory food with much less effort on our part.

Jack-in-the-pulpit is the plant so commonly used by smart alecks to carry out what they think is a practical joke. Having had the joke played on me as a youngster, I am unable to see the funny side to it. The deeply buried, bulb-like base looks as though it were edible. A trial bite does not provide instant warning, with the result that a second and larger bite may be taken. About this time, the effects of the first bite become evident, and the oral suffering is nothing to laugh at. Anyone playing a trick like this on an innocent friend probably should be punished by being forced to take a bite of his own medicine. It is doubtful if such a procedure would bring about general adoption of jack-in-the-pupit root-eating as a form of popular entertainment. The same structure that causes so much discomfort when eaten raw is entirely acceptable when cooked. Cooking destroys the harmful agents, and it is reported that the Indians used to use this plant in soups and in a roasted form rather generally. Frankly I get more satisfaction seeing the plant growing than I could ever get from having its storehouse of food contributing to my diet, at least under any ordinary circumstances.

FIGHTING THE SPRUCE BUDWORM

(Continued from page 184)

of Entomology has determined that dosages used in forest control projects, like the one just completed, are not harmful to wildlife or humans. DDT, says the Bureau, is a weapon that can be used effectively by trained personnel when and where the occasion demands.

Those facts promise to add up to some substantial timber savings in the years ahead. For all types of timber, America's yearly deficit between growth and drain amounts to 291 million cubic feet. Losses caused by insects, disease and windfall total one billion, 19 million cubic feet a year, while fire losses amount to about 460 million cubic feet. Thus, the combined losses caused by these destructive agencies, totalling one billion, 479 million cubic feet, are four times our present timber deficit. Any major victory in the war on forest pests, including the spruce budworm, is a major step toward bringing the nation's forest economy into balance.

How to Know the Birds

How to Know the Birds. By Roger Tory Peterson. Boston. Houghton Mifflin Company. 1949. 144 pages. Illustrated in color and black and white by the author. $2.00.

This handy little book is a sort of pre-ornithology course by the author of the famous and standard *Field Guide to the Birds.* More than two hundred common birds are pictured and described. It is a book for one who has never had a bird guide before and who needs a background of advice on bird watching and identification. Ability in this field is attained by many through a laborious trial and error experience. Now Roger Peterson comes to the rescue with this little book that will enable the neophyte bird enthusiast to save much time, perfect techniques of observation and move on to more complicated things. The first part of the book deals with what to look for in the way of field marks, actions and such characteristics as quickly stamp the bird to be what it is. This is followed by information on the families and representative species; then habitats and where to look for birds.

ANSWERS TO UNSCRAMBLE HIDDEN NAMES

1. vulture	1a. tule
2. dianthus	2a. shad
3. phalarope	3a. rape
4. geranium	4a. ramie
5. mallard	5a. llama
6. shearwater	6a. wheatear
7. cardinal	7a. ani
8. nutcracker	8a. tuna
9. nuthatch	9a. chat
10. nonpareil	10a. pear
11. magpie	11a. pig
12. sparrow	12a. sora
13. turnstone	13a. tern
14. woodchuck	14a. cuckoo
15. solitaire	15a. sole
16. woodpecker	16a. rook
17. guillemot	17a. gull
18. clematis	18a. mate
19. grasshopper	19a. grape
20. locust	20a. lotus

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

GENERAL REQUIREMENTS APPLICABLE TO CLASSIFIED ADVERTISING

1. *Transactions based on good faith:* Transactions are based on good faith and mutual satisfaction. Deliberate misrepresentation, disregard of usual business ethics or the attempt to circumvent these general requirements, when brought to our attention, will result in refusal of further advertising.

2. *All orders subject to these conditions:* We reserve the right to edit all copy to conform with our standards and to reject or discontinue any advertisement which we consider undesirable.

3. *Who may advertise:* This department is an open market trading post. Any individual or firm whose advertisement and methods of doing business meet our requirements may advertise their goods or services.

4. *Rates:* All classified advertisements must be accompanied by remittance. The rate is 15c per word including name and address—minimum charge $2.00. Cash with order.

5. *How to count numerals, etc.:* Groups of figures are counted as one word. Abbreviations consisting of initials or single characters likewise are counted as one word. Hyphenated words are counted as two words.

6. *"For Sale" ads must state prices:* A specific price must be stated on all FOR SALE ads —except that the phrase "write for catalog" may be used when listing real estate or merchandise in quantities.

7. *Conditions of trade or sale:* The condition of binoculars, cameras, instruments, other equipment useful to outdoor lovers, home-owners, etc., advertised for sale or trade must be specified as follows: PERFECT—meaning factory condition; EXCELLENT—meaning new condition, implying negligible amount of use; VERY GOOD—meaning practically new condition, implying little use, with no appreciable wear and only minor surface scratches or wear; GOOD—meaning moderate condition and with only moderate wear; FAIR—meaning no parts missing necessary to use, reasonable wear inside and out; POOR—meaning marred appearance or badly worn.

8. *Non-specific phrases barred:* Phrases such as "highest" or "top prices paid", as well as any other so-called "auction-type" phrases are not acceptable. The terms "fair price paid" or "state price wanted" may be used.

9. *Blind ads not acceptable:* Box number or blind ads will not be acceptable. Give your complete name and address to insure prompt delivery of all mail or telegraph replies.

10. *Requesting privilege of examination:* Purchasers desirous of examining merchandise before acceptance should request shipment by express C. O. D. with examination privilege. This procedure permits the purchaser to inspect the merchandise in local express office and authorizes the express company to return unsatisfactory merchandise at shipper's expense.

11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

BIRDS

FIELD GUIDE TO THE BIRDS, 1939 edition regularly $2.75 only 98¢ postage prepaid. Money-back guarantee. Free bargain catalog on request. Dover Publications, 1780 Broadway, New York 19, Dept. NB.

BIRD HOUSES

WOODEN BIRD HOUSE BARGAIN. Requires only nailing together. Two for $2.50, prepaid. TIFFT, 203 Tifft Road, Dover, N. H.

BOOKS

ASTRONOMY FOR EVERYODY, Newcomb's classic guide, only 98¢, postage prepaid. Money-back guarantee. Free bargain catalog on request. Dover Publications, 1780 Broadway, New York 19, Dept. NC.

144 SIMPLE, INTERESTING EXPERIMENTS in the "HOW BOOK OF SCIENCE." Contains scientific knowledge for making many useful articles. $1.25 postpaid. Standard Science Supply Co., 1232 N. Paulina, Chicago 22, Illinois.

BOOKFINDERS! (Scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377nm, Beverly Hills, Calif.

NATURE MAGAZINES. Volumes 1 to 10. Will sell any number. Write, Mrs. A. E. Charlton, 2121 Wilson Ave., Chicago 25, Ill.

BOOKS! Hard-to-find and out-of-print our specialty. All subjects. Send Wants! Jaher Book Service, 620-N East 178th St., New York 57.

BULBS

CONIFER - LILY - RARE Seeds, Bulbs, Jade Orchid Cactus, House Plants. Catalogue free. Ransom Seed Specialists, San Gabriel, Calif.

BUSINESS OPPORTUNITIES

EARTHWORM BREEDING. Valuable bulletins on successful methods mailed free. Earthmaster Publications, Dept. 17, Sun Valley, Calif.

BUTTERFLIES

DIFFERENT, NAMED, GUARANTEED Quality: 100 Tropical Butterflies, Moths, $10.00; 20 Indian, with leaf, Orange-tip Butterflies, $2.00; 20 Brazilian, with Morpho, Fig. 8, $2.00; 20 Native, including pair of Parnassius, Argynnys, $2.00; 10 Native Hesperidaes $1.00; Giant Owl, Map, Glass-wing, Agrias $3.00; 10 Native Moths, with Luna $2.00; Praying Mantis Egg-masses, $1.00 dozen; Postage 25¢ extra. Michaels, 7415—3rd Avenue, Brooklyn 9, N. Y.

LIVING COCOONS

LIVING COCOONS: 15 assorted $2.00. 40 assorted $5.00. M. Spelman, 2781 Grand Concourse, New York 58, N. Y.

If you have never seen the emergence of our giant silk-spinning moths from their cocoons, or the gorgeous swallow-tail butterflies from their crysalids, you are in for a thrill you will remember all your life. It is the most exciting and beautiful sight to see them emerge from their dull winter wrappings, with embryonic wings in 20 minutes expand and take on all the hues of the rainbow. As an education in the mysterious ways of nature it is without parallel. If you are a student of nature; a member of a society or museum, or if you have children attending nature classes, you simply must obtain several specimens of the following species.

COCOONS: No. 1. Samia cecropia, $.10 ea. No. 2. Telea polyphemus, $.10 ea. No. 3. Calosamia prometha, $.10 ea. No. 4. Philosamia cynthia, $.10 ea. No. 5. Actias luna, $.30 ea. No. 6. Automeris io, $.20 ea.

PUPAE: No. 11. Eacles imperialis, $.50 ea. No. 12. Citheronia regalis, $.75 ea.

CHRYSALIDS: No. 20. Papilio turnus (Tiger swallowtail), $.25 ea. No. 21. Papilio asterias (Eastern swallowtail), $.25 ea. No. 22. Papilio troilus (Spice-bush swallowtail), $.25 ea.

Directions for care of living Cocoons, Pupae & Chrysalids sent free with every order. No. 1, 5, 11, & 12 cannot be shipped to California because of state regulations. On all cocoon orders less than $3 enclose 15¢ for postage and insurance. For further butterfly bargains see our large display ad on page 159. BUTTERFLY WORLD SUPPLY HOUSE, 289 E. 98th Street, Brooklyn 12, N. Y.

"LIVING COCOONS SPECIALS"; $2.00 each lot; 30 Cynthia; 24 Promethea; 4 Luna; 12 Papilio turnus; 20 Americana; 25 Tityrus; 20 Eagle; Mixed Pupae $1.25 dozen. Postage additional. Dr. Miller, Box 47, Station "E," Brooklyn 7, N. Y.

DOGS

REGISTERED HUSKIES — Excellent — Gentle — Fine Companions. Pups $50.00 and up. Send 25 cents for pictures. Fields Kennels, Gooding, Idaho.

BEAUTIFUL USEFUL COLLIE-shepherds, pups, $15. Paul Schultetus, New Liberty, Illinois.

FIELD GLASSES

TELESCOPES, BINOCULARS, microscopes—big bargain catalog free. Brownscope Company, 24 West 45th St., New York, N. Y.

HOBBY

BIOLOGICAL HOBBY CATALOG 10¢. Reptile Bulletin 5¢, 10 issues 50¢. Pair Hamsters $2.75. Chameleon 25¢. Alligator $2.50. Quivira Specialties. Topeka 20, Kansas.

HOBBY

YOU CAN ENTERTAIN with chalk talks. Catalog 10¢. J. G. Balda, Cartoonist, Oshkosh, Wis.

POST CARD EXCHANGE: Six cards and dime for six variety cards. Lester Cooper, Shelton, Nebraska.

KODACHROMES

KODACHROME SLIDES ON APPROVAL. Scenes, wild life, flowers. Yellowstone, Grand Canyon, Glacier, Mesa Verde, Sequoia, Tetons, Death Valley, Banff, Jasper, Arizona, New Mexico, etc. Just name area desired, no obligation. Douglas Whiteside, Yosemite, California.

PHOTOS

"WILDERNESS WAYS" natural history and scenic kodachrome (2x2 slides) for sale or exchange. Correspondence invited. Write: Ross Geiling, Council, Idaho.

YOUR BETTER NEGATIVES cropped, reprinted, 3¼ in. square to 3½x5¾—6¢ each, 6 alike 30¢; 4x5—10¢, 3 alike 25¢; 5x7—20¢, 3 alike 50¢; 8x10—35¢, 3 alike 90¢. Intermediate sizes same as next larger. Commercial Photo Service, Mancelona, Michigan.

PLANTS

RHODODENDRON MAXIMUM, Mt. Laurel, Hemlock, Holly and Flame Azalea 8"-18" 50-$3.00; 100-$5.00; 2-4 ft., 10-$3.00; 25-$6.00; 100-$20.00. J. F. Norris, Doeville, Ten.

CARDINAL FLOWERS, BLOODROOT. Lepaticas; field grown. $3.00 per dozen, postpaid. Write for price list. Valley Gardens, 21301 Telegraph Rd., Route 3, Detroit 19, Michigan.

HARDY NATIVE SHRUBS, perennials, orchids, vines, rhododendrons - azaleas. Free Catalogue. Three Laurels, Marshall, N. C.

CALIFORNIA REDWOOD BURLS—sprouts green foliage in bowl of water. Sizes $1.00, $2.00, $3.00. Robert Oyen, 694 30th Ave., San Francisco 21, California.

POEMS WANTED

POEMS wanted for musical setting. Send poems for FREE examination. Hamann Service, 590 Manhattan Building, Milwaukee, Wisconsin.

SEA SHELLS

SEA SHELLS appeal to Nature Lovers. Try these offers today: 12 Attractive Land Shells, $1.00; 12 Marine Shells, $1.00; 5 Odd Marine Specimens, $1.00. List of beautiful polished and unpolished shells on request. Mrs. F. K. Hadley, Box 33, West Newton, Mass.

THE MOON IN TOTAL ECLIPSE

(Continued from page 190)

world, where air and water do not exist and where no vegetation appears on barren mountains, rocky plains, or in countless craters, and where, there is every reason to believe, pulverized pumice and meteoric dust is to be found everywhere.

On April 28 there will also be a partial eclipse of the sun. The greatest magnitude will be 61 hundredths. This will be the part of the sun's diameter covered by the moon at time of greatest eclipse, which will occur in longitude 56 degrees west of Greenwich and latitude 62 degrees north, near the coast of Greenland. This eclipse will not be visible in the United States, but in the Arctic regions, North Atlantic, Europe, and Northern Africa.

On April 16 there will be an interesting occultation by the moon of the first magnitude star, Antares, in the constellation of Scorpio. This will be visible in the eastern part of Canada and the eastern and north central states. At Washington the star will disappear behind the moon at 1:36 A.M., April 16, and it will reappear at 2:50 A.M., Eastern Time. Observations of occultations are important for obtaining improved positions of the moon, and are observed continuously by many observers.

At places that are within the region over which this occultation will be visible, the times of the disappearance of the star behind the moon, and of its reappearance some time later, will differ considerably, depending upon the location of the place. By noting the motion of the moon relative to the star during the evening, one can estimate roughly when the event will occur. Accurate predictions are made in *The American Ephemeris* of many occultations occurring at five different positions in the United States, and their vicinity, throughout the year, for the benefit of those who wish to observe them telescopically.

Mercury will be in superior conjunction with the sun on April 12, and will be visible above the western horizon after sunset by the end of April. Venus will also be in conjunction with the sun on April 16, and not visible throughout the month. The two planets will be in conjunction on April 12. Mars also will be too close to the sun to be seen this month. It will be in conjunction with Venus on April 2, and with Mercury on April 8. Jupiter is a morning star this month in Capricornus. It may be seen in the southeast a few hours before sunrise. On April 23 it will be near the meridian at sunrise. Saturn is now high in the eastern sky at sunset in Leo, setting some time after midnight. The annual swarm of meteors known as The Lyrids may be seen in the early morning hours of April 21.

CAMERA TRAILS

(Continued from page 193)

fan. The American Museum of Natural History in New York is his favorite hunting ground with either Brownie reflex and flash attachment, or Ansco Speedex f/4.5. He uses a tripod with the latter, taking pictures as slow as ½ second. He adds: "I found that by focusing the flash camera from a side angle, I got only a little reflection on one side and this could be trimmed off when the picture was printed. In a group where the subject isn't too near the case front, the lens of the camera can be held against the glass, thus cutting out reflections. In a shot of a group of Rocky Mountain sheep, I got a reflection on the backdrop that was painted to look like the sky. The effect was that of the sun seen through mist and it added much to the picture."

From Adrian C. Fox in Lincoln, Neb., has come a cheerful photo Christmas card featuring a chipmunk, plus reprints of two of his articles; one is on "Soil Conservation Education in Public Schools," which appeared originally in the *American Biology Teacher*, and the other deals with "Christmas Bird Censuses," from the *Nebraska Bird Review*. The former is effectively illustrated with photographs.

As for trade notes, Eastman has announced a new twin-lens Kodak Reflex II camera, offering a number of features not included in the original model. The new reflex has a plastic Ektalite field lens in the viewing system, a top speed of 1/300, and an automatic film stop. It uses 620 roll film.

For home movie fans who have lettering troubles, Notogavure, Inc., 139 W. 22nd Street, New York City, offers "Movietype," a set of 1862 letters, half of them black and half of them white, a sheet of clear acetate for superimposition, and four colored paper sheets for backgrounds. Not only can the letter sets be used in making movie titles, but also for slides, greeting cards and picture titles.

Matter

The Structure of Matter. By Francis Owen Rice and Edward Teller. New York. 1949. John Wiley and Sons. 361 pages. $5.00.

This is the introductory book in the Wiley Structure of Matter Series. It is designed to show the development of our knowledge of atomic structure and to summarize the results of quantum mechanics. Dr. Rice is Professor of Chemistry at the Catholic University of America and Dr. Teller is Professor of Physics at the University of Chicago. The series is under the advisory editorship of Maria Goeppert Mayer.

Hardy Squirrels

Aboard a Pan American World Airways "Clipper" over the Pacific, Francis R. Line, writer and lecturer, read the brief article in our January issue about the ability of squirrels to fall considerable distances without apparent injury. He was kind enough to report a bit of supporting evidence out of his own observation some years ago. Two squirrels were fighting on the roof of a house, and the battle brought them so close to the edge that they fell over, landing on the cement walk below. Each squirrel got up from the walk, hesitated briefly, and then both went off, apparently no worse for the fall. They were no longer interested in fighting, however.

Jesse E. McCrory of Clemons, Iowa, reports another incident of a squirrel falling, this one from a tree branch at least thirty feet above the pavement. In this case the animal lay sprawled on the pavement, so apparently injured that Mr. McCrory felt that the humane thing would be to dispatch it. As he moved toward the animal, however, it dragged itself to the tree from which it had fallen, and, with one paw failing to grip the bark, made its way to the lowest limb and stretched out to rest. Later there was no trace of the squirrel, suggesting that its injury had not been severe.

Edna Writes Another

Bob Vincent, Veterinarian. By Edna Hoffman Evans. New York. 1949. E. P. Dutton and Company. 192 pages. Illustrated by Bernice Oehler. $2.50.

Our versatile editor of the Camera Trails section of *Nature Magazine* adds again to her writing laurels with this well-told and engrossing story of Bob Vincent, who loved animals. There is ample adventure and much suspense woven into a story in which interest in animal pets and their care is a central theme. A hit-and-run accident involving two other boys and Bob's dog, Snorky, provides struggle and strengthens Bob in his determination to devote his life to ministering to animals. This is a book that both boys and girls will enjoy to the fullest.

Historical Geology

Historical Geology. By Carl O. Dunbar. New York. 1949. John Wiley and Sons. 567 pages. Illustrated. $5.00.

Retaining the objective of an earlier book by the author and the late Charles Schuchert, which was to interest the reader and appeal to his imagination and understanding as it surveys the past history of our planet and of life on Earth, this new book is, in effect, a revision. Special emphasis is placed upon illustration. Supplemental to the book is a set of two-by-two color slides, information with respect to which may be obtained from the publisher.

Virginia Wildlife

"Game Birds, Mammals, Fish of Virginia" is the title of a particularly attractive 62-page booklet issued by the Commission of Game and Inland Fisheries of the Commonwealth of Virginia at Richmond. It treats, textually and pictorially, with ten birds, six mammals and a dozen or so fishes. Copies are available free to Virginians, and at twenty-five cents a copy outside the Commonwealth.

Unusual Trees

Word comes from Glen P. Burns of the Westinghouse Electric Supply Company, 546 North Broadway, Milwaukee 2, Wisconsin, that he received many helpful responses to our note in the January issue telling of his collection of photographs and data on unusual trees in connection with publication of a book of this material. He wants us to express appreciation of these and to say that, since the book is still in the early stages of preparation, he is still interested in such material.

Quetico-Superior Film

"Wilderness Canoe Country" is the title of a thirty-minute, 16mm. color film, with sound commentary and musical background brought out by the President's Quetico-Superior Committee, 919 North Michigan Avenue, Chicago 11, Illinois. The theme of the film is the story of a father who, after many years, takes his son back to enjoy the wilderness gem he had known—the Quetico-Superior wilderness canoe country. They experience varied emotions at discovering what the inroads of civilization have meant at some points in changing the wilderness character. This film is available for purchase or rental, and all details may be obtained from the Committee at the address given above.

Council Fires

Council Fires. By Ellsworth Jaeger. New York. 1949. Macmillan. 253 pages. Illustrated by the author. $2.95.

In the October, 1948, issue of *Nature Magazine* we gave a partial preview of this interesting and useful book when we published the author's article on Indian dances. Such an article should whet one's desire for the entire volume, and that desire is admirably met by the book itself. In a word, Mr. Jaeger takes the camp fire, which, since early times, has been a focal point of many human activities and translates it into modern terms and usage. We should say that this book would be indispensable to anyone concerned with camp work; with youth—or even adult—leadership. It is altogether a fascinating volume.

Western Winter Woes

First reports to the U. S. Fish and Wildlife Service indicate that the worst western winter in many years has taken a heavy toll of wildlife in many sections. The most critical areas were northern Wyoming, central Montana, Colorado, Idaho, northern Nevada, and western Oregon and Washington. One million ducks normally winter in this general area and have suffered terribly from starvation, or have been frozen. Upland game birds and big game animals have suffered in proportion. Natural food was exhausted and emergency feeding was resorted to cooperatively among State game departments, sportsmen's groups, farmers and the Service. The toll, nevertheless, has been heavy.

Frogs and Toads

Handbook of Frogs and Toads. By Albert Hazen Wright and Anna Allen Wright. Ithaca, New York. 1949. Third Edition. Comstock Publishing Company. 640 pages. Illustrated. $6.50.

First published in 1933, with a second edition in 1942, this volume is established as the standard work on the frogs and toads of North America. As such it should, of course, be in every properly stocked public library and in the personal libraries of anyone interested in this field of natural history. This volume lays the basis for study and understanding of frogs and toads, provides keys to their identification, and concludes with the individual descriptions and a voluminous bibliography. It is an invaluable book.

Apology to Marietta

On the "Contents Noted" page in our January issue we carried brief reference to a picture that appeared in *This Week Magazine* in juxtaposition to an advertisement of Betty Crocker split pea soup. The picture showed some Marietta, Georgia, school children admiring a stuffed robin on a nest, with a large box of birds' eggs also in view. The caption under the picture included the sentence: "The children gathered birds, nests and eggs from around the countryside." We commented with some acidity on this sort of Nature education. It now appears that the picture was a part of the advertisement of the soup and the "bright" idea of an advertising agency. It also appears, according to Shuler Antley, superintendent of the Marietta Public Schools, that whoever supplied the caption for the picture was doing Marietta an injustice, which we, in all good faith, perpetuated. Mr. Antley assures us that there is special effort in Marietta to teach the children a love for birds and the importance of protecting them. Stuffed birds were purchased from a school supply house, and the eggs, Mr. Antley says, were collected from abandoned nests more than 15 years ago, the nests being collected after abandonment. We apologize to Mr. Antley and his teachers, but not to Betty Crocker's split pea soup.

Under the Microscope

By JULIAN D. CORRINGTON

Clam glochidia, 95X.

PARASITIC CLAMS

If one were asked to name that animal group least likely to include any parasitic species, he could scarcely think of a better nomination than clams. The whole phenomenon of parasitism, with all of its manifold and devious phases and requirements, would seem to be utterly foreign to this sedentary class of mollusks; yet it is this very fact—of lack of anything much in the way of locomotor abilities—that has probably been responsible for development of the parasitic habit in certain freshwater mussels. In them it has become a highly perfected and valuable adaptation, although strange, indeed, to the normally humdrum ways of life of clams.

The more primitive members of the class, and the majority of its advanced types, as well, go through a series of reproductive stages that are considered typical and that indicate the pathway of their racial history. Generally the sexes are separate; a male clam sheds sperm cells and a female clam sheds eggs to the surrounding water, where these germ cells meet in external fertilization. In marine species the embryo develops into a more or less spherical larva provided with a belt of cilia, which propel the tiny animal and collect food particles for its nutrition. This creature is the *trochophore larva*, a form that occurs in marine worms and in all molluscan classes save that of the squids and octopuses. In turn, this stage develops into a *veliger larva*, peculiar to mollusks, in which the ciliated band expands into lobes, and such characteristic organs as the shells and foot make their appearance.

Both the trochophore and veliger larvas are free-swimming, and may also be carried by currents, thus effecting dispersal of the species before the veliger changes to the sedentary (clam) or sessile (oyster) adult estate. The most remarkable adaptation for this dispersal, however, is encountered in the freshwater clams or mussels, Family Unionidae, two of whose genera, *Unio* and *Anodonta*, have long been widely used as type animals for both the class and the phylum in elementary biology and zoology courses. There are some thousand species in this family, and, in most of those thus far studied, the veliger is modified into a somewhat different larva, the *glochidium*. This word means the point or tip of an arrow, and was formerly applied as the name of a separate genus, before the fact was established that "*Glochidium*" was but a stage in the life cycle of some other species.

The life history of *Anodonta* is the one generally cited in recounting these strange affairs in the Unionidae. The female does not shed the eggs; rather they pass from the genital aperture onto the surfaces of the gills, thence through microscopic respiratory pores to the interior of the gills. Sperm cells from the male enter via the incurrent siphon of the female, are drawn over and into the gills, and there fertilize the eggs, usually during August. Development takes place within the maternal gills (of all odd places!), there being no free trochophore stage, and the resulting glochidia pass the winter in this sheltered situation. Comes spring and great numbers of them are liberated, passing out through the excurrent siphon into the surrounding water. Since they have no means of locomotion, but are very tiny and light in weight, they sink slowly to the bottom.

The great majority of released glochidia are destined to die without further completion of the life cycle; just as in other parasites, enormous numbers must be produced so that a few may win through to the next stage. Should a fish touch a glochidium while it is floating or while it lies on the bottom, the two valves of the larva's shell snap shut like a fairy bear trap. Typically, the glochidia of *Anodonta* fasten upon the mouth, gill cover (operculum) or fins, whereas those of *Unio* are more apt to be found upon the gills themselves—a softer, more protected, and more nutritious berth. It is stated by Potts that the mother clam discharges glochidia if a fish swims near her. Bombarding the passing vehicle with potential parasitic passengers greatly increases their chances for survival.

The fish so attacked may have a natural or acquired immunity; in some species, all individuals are immune; in others, only certain ones. When this is the case, such larvas as escape dissolution drop off after a day or two. If not the case, the host tissues proceed to grow around the invading larvae, responding to the stimulation by enveloping the offenders completely, making tiny lumps the fish culturist calls "blackheads." Here the clam larvas remain for a time that varies greatly—from three to twelve weeks, according to Hegner—meanwhile subsisting partly on some of their own discarded tissues but mostly on host tissues and juices. Adult structure is attained and, as miniature mussels, the former glochidia force their way out of the cysts and fall to the stream bottom, never again to journey far afield as the unwanted guest of some finny carrier. Their parasitic days are over and they have nothing to do thereafter but lead a clam's life! *Anodonta* glochidia are provided with hooks so that they literally hook a ride on their host; but the hookless larvas of *Unio* seem to get there just the same.

Sometimes, as revealed by records, freshwater mussels have colonized new drainage areas with great rapidity, showing the effectiveness of this parasitic epoch in their life cycle as a means of dispersal. This must have been true farther back in the past as well; we find these mussels widespread. But if dispersal is the chief gain, the method of attaining it is a singular one, to say the least.

In appearance, a clam glochidium is bivalved and is provided with a single strong adductor muscle to close the shells. Commonly there is a single hook on each valve, behind which lies a row of tufts of bristle-like setae. A long, more or less coiled and sticky thread, the byssus, protrudes from the middle of the animal.

It has been customary to regard the infestation of fishes by glochidia in about the same light as that of man by ticks and "chiggers"—as no more than a nuisance. Pratt even suggests an indirect benefit in that the presence of these parasitic larvas appears to render the host less likely to attack by fish lice. That glochidiasis is not to be taken so lightly, however, has been shown through recent studies on rainbow trout by H. S. Davis and Garth Murphy. In the Truckee River, California, rearing pools, glochidia of the mussel *Margaritifera margaritifera falcata (Gould)* had been carried in with the water supply from the river and practically every trout fingerling was infested.

In some cases these parasites were so abundant as to prevent the gill covers of the victims from closing. The mortality was heavy. Murphy found that, again contrary to formerly held views, the glochidia could live for as long as eleven days without attaching to a host.

Rainbow trout 42 mm. (1-⅝ in.) in length were studied for incidence and consequences of infection, those with 600 to 1200 glochidia were termed heavily infested and suffered a severe mortality due to obstruction of circulation in the gills. Those with less than 400 glochidia per fish usually did not die as a direct result of this parasitism, but there was mortality from such secondary invaders as fungi and bacteria. The glochidia remained attached to the gills 36 days and during that period increased about 660 percent in length.

Using this same species of mussel glochidia, Murphy found that rainbow and brown trout were more susceptible than brook trout. Slight experimental infections were obtained with one species of sucker and two minnows, none at all with whitefish and sculpin. Davis found glochidia abundant on the gills of fingerling chinook salmon; none on blueback salmon.

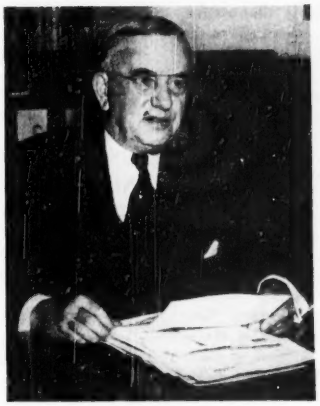
It is not possible to remove glochidia from fish, once they are attached and embedded. There is no way known at present to prevent infection of fish in the natural state save that of systematically exterminating all mussels. Since the bivalves are usually the more valuable of the two organisms, no such extermination is even proposed. Glochidia can be screened out of water that is to be used in hatchery work, but the best preventive method is to avoid collecting water during the period when glochidia are being released: use previously impounded water, if possible.

The mounting technique for slides is similar to that for forams or pollen grains and offers no special difficulties. The glochidia, obtained from a ripe female mussel, are killed and fixed in any standard reagent, dehydrated, cleared, and mounted, with or without staining. The chief concern is to exclude air bubbles, requiring slow and gradual dehydration and a longer than ordinary stay in the clearing agent. A quick-setting mountant, such as Clarite, is preferable to balsam, and slides of this character must be stored flat, never on edge, otherwise all specimens will soon drift to the edge of the coverglass that happens to be lowermost.

THE MICROSCOPE MAKERS

IV. M. Herbert Eisenhart

THE subject of this biographical sketch and the amiable gentleman whose features adorn this page is the President and General Manager of the Bausch & Lomb Optical Company, Rochester, New York. Like other successful



M. Herbert Eisenhart

business men, his titles and affiliations would fill a column of print, and he well exemplifies that old statement, that if you want to get something done, give it to a busy man. His companies and his city have done just that, and "Herb" Eisenhart, as he is affectionately known throughout the plant and in business Rochester, somehow finds time to attend to all of his manifold responsibilities.

The son of Charles A. and Emma Pfahler Eisenhart, Herbert was born at York, Pennsylvania, September 16, 1884. His father was a dentist with a flair for things mechanical and electrical, and these interests were passed on to Herbert and his four brothers. Graduating from Princeton in 1905, young Eisenhart next completed a chemical engineering course at M. I. T. in two years, receiving his B.S. from there in 1907. That same year he went to work for the Eastman Kodak Company. By 1911 he had become assistant superintendent of their chemical plant, and, in 1913, superintendent. It was while serving in this capacity, in 1917, that Bausch & Lomb, burdened with war work, sought his services as general superintendent. By 1926 he was vice-president and assistant general manager under the leadership of the late Dr. Edward Bausch and, in 1929, general manager. Mr. Eisenhart was elected president of the company in 1935.

During World War II, Bausch & Lomb not only accepted and met huge contracts for a great variety of gunfire control and military optical instruments, but also taught other contractors how to produce such equipment. The direction of this work has been guided by Mr. Eisenhart, and its success was attested by the award of the Army-Navy "E" with five successive stars, the highest in the nation.

Mr. Eisenhart married Elsa Bausch in 1914, and they have one daughter and two sons. He is a member of many clubs in New York and Rochester, and his outside interests include education, biography, and history.

The No. 1 man at B & L received the Rotary Club's Civic Achievement Award "in recognition of his contributions to the progress and development of Rochester" in 1939. In 1944 he was the recipient of the Rochester Civic Medal, in recognition of production of "essential scientific instruments that are making America supreme in commerce and in conflict."

Really big men remember their youth. From 1933 to 1936 Mr. Eisenhart was president of the Rochester Council of Boy Scouts, and from 1936 to 1940 was chairman of Region II, comprising 110,000 Scouts in the 66 counties of New York and New Jersey. For years he has been prominently connected with the Rochester Institute of Technology (director, committees), University of Rochester (chairman of the Board at present), Eastman School of Music (director), Rochester Community Chest (president two years), Hillside Children's Center (trustee and officer), Newcomen Society (committee chairman), Navy Industrial Association (officer), National Association of Manufacturers (director, committees), Rochester Chamber of Commerce (director), Rochester Chapter, American Red Cross (director). In addition he is a director in two banks and holds memberships in the Optical Society of America, United States Chamber of Commerce, American Chemical Society, the Army Ordnance Association, the Engineering Society of Rochester, and was an alumnus trustee of M. I. T. for five years.

As if these duties were not enough for any five good men, Mr. Eisenhart received a State appointment in 1943, that of vice-president of the postwar planning Committee for Economic Development for New York State. In the spring of 1947 he was among fifteen of the nation's leading industrialists to fly to Germany on a War Department-sponsored tour to study economic conditions in that strife-torn country.

In spite of his great array of honors and responsibilities, however, "Herb" is primarily and essentially the friend of all of the thousands of employees of the Bausch & Lomb organization, where he is known and warmly admired by all. One of his liveliest interests is the annual party given the Early Settlers Club, composed of those who have served the company 25 years, and especially the Settler's Half-Century Club, whose members have been associated with Bausch & Lomb for fifty years—a whole lifetime of loyalty and service to the firm and its aims. Mr. Eisenhart's favorite motto is one that each of us could well adopt: "To succeed in industry and business, a man must do conscientious work and be dependable."

REVIEWS

Marine Biology The first complete handbook of Atlantic corals marks the initial bow to the general reading public of the University of Miami Press, which has other related publications now in preparation. Dr. F. G. Walton Smith, British born and educated, Professor of Zoology and Director of the Marine Laboratory at the Coral Gables institution, is the author of *Atlantic Reef Corals*.

This small and easily read volume dispenses with technicalities for the non-specialist, but after each species description there is a scientific diagnosis in italics; thus both interests are served. Fifty-two species are described—all of those occurring in Florida, Bermuda, the West Indies, and Brazil—and thirty-one are illustrated with gorgeous photographic plates by Frederick M. Bayer, at the time on the University's Marine Laboratory staff, now of the U. S. National Museum.

There is a glossary of technical terms, a simplified popular key, and a taxonomic key, together with a selected bibliography. The chapters that will be somewhat of a surprise in a handbook, however, and that will greatly please the layman, are those first six dealing with distribution of coral reefs over the world, the Western Atlantic reefs in particular, how reefs and atolls are formed, the structure, habits, and associates of living corals, and the collection and preparation of corals. On these topics Dr. Smith speaks with the authority of long familiarity. He has for some years been in charge of the marine zoology course at the University of Miami, where students don diving helmets and go overboard in reef territory to observe, with other items, the gorgeous color and delicate form of the living reef corals—a very different picture from that presented by the dead and dry skeleton we designate a coral. This book is very well written and will form a welcome addition to the library or the pocket of whatever beachcombing attire one prefers in rambles along southern shores. Pp. 112, plts. 41, text figs. 11. Univ. Miami Press, 1948. Distributed by Farrar, Straus & Co., Inc., 53 E. 34th St., New York 16. $3.75.

NO CONTEST

As we had feared, our search for a suitable name to replace the intrenched but incorrect designation "Amateur Microscope" has ended in failure. Our thanks to the many who tried. A long list of names has been submitted to date, but none of them come up to the requirement of indicating the specified type of microscope with a name that stands any chance of adoption. So "amateur microscope" it will have to be.

Reminds us of the recent case of students at the University of Miami:—they used to call their old coke-and-hot-dog hangout by the realistic but definitely unaesthetic appellation of "Slop Shop." Came a gorgeous new Student Club building with, among many other facilities, a modern snack bar. The undergraduate newspaper, the *Miami Hurricane*, campaigned for a suitable name for this new rendezvous. A large number of names were submitted and a general election was held. The winner? You guessed it—the "Slop Shop!"

S.M.S.I. JOURNAL

The State Microscopical Society of Illinois, which dates back to 1868, is again publishing an interesting magazine. Volume III of *Micro-Notes*, successor to the *Bulletin* and to its later offspring, *Diatom Notes*, is greatly improved in content, appearance, and size. Recent articles deal with the microscopical image, drugs, enzymes, bacteria, flowers, tobacco smoke, photomicrography, sectioning insects, staining protozoa, and many other subjects. Out-of-town subscribers are welcomed: send a dollar bill for one year's subscription, four issues, to I. J. Coldevin, Managing Editor, State Microscopical Society of Illinois, 2001 N. Clark St., Chicago 14, Ill.

NEW PHOTOMICROGRAPHIC EQUIPMENT

A new camera with accessories that make it a complete photomicrographic laboratory in a single unit has been developed by the Bausch & Lomb Optical Company.

Used for visual observation as well as for taking photographs at high or low magnifications, enlarged, actual size, and slight reductions, of transparent and opaque specimens, the versatile unit has many novel features.

The camera and its equipment are convenient and easy to operate. A sliding baseboard serves as a mount for changing over from visual observation to photographic recording. The unit's all-steel construction affords absolute rigidity and freedom from vibration for highly precise work.

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Mounted on a stationary upright and steel supporting cabinet for storing the accessories when not in use, the unit accommodates a microscope that can readily be moved by means of the sliding baseboard to bring the eyepiece into position under the camera.

Among the unit's new accessories are various specimen-illuminating units for high and low power photomicrography. Diversified light systems include both oblique surface illumination, direct transmitted light, or a combination of both. Changes in the many light variations can be made quickly with a minimum number of accessories.

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Wood Frog, *Rana sylvatica*
Bullfrog, *Rana catesbeiana*
Common Tree Toad, *Hyla versicolor*
Barking Frog, *Hyla gratiosa*
American Toad, *Bufo americanus*
Meadow Frog, *Rana pipiens*
Ornate Chorus Frog, *Pseudacris ornata*
Sphagnum Frog, *Rana virgatipes*
Green Frog, *Rana clamitans*
Green Tree Frog, *Hyla cinerea*
Squirrel Tree Frog, *Hyla squirella*
Southern Toad, *Bufo terrestris*
Spadefoot, *Scaphiopus holbrookii*
Pickerel Frog, *Rana palustris*
Mink Frog, *Rana septentrionalis*
Southern Meadow Frog, *Rana pipiens sphenocephala*
Southern Swamp Cricket Frog, *Pseudacris nigrita nigrita*
Eastern Swamp Cricket Frog, *Pseudacris nigrita feriarum*
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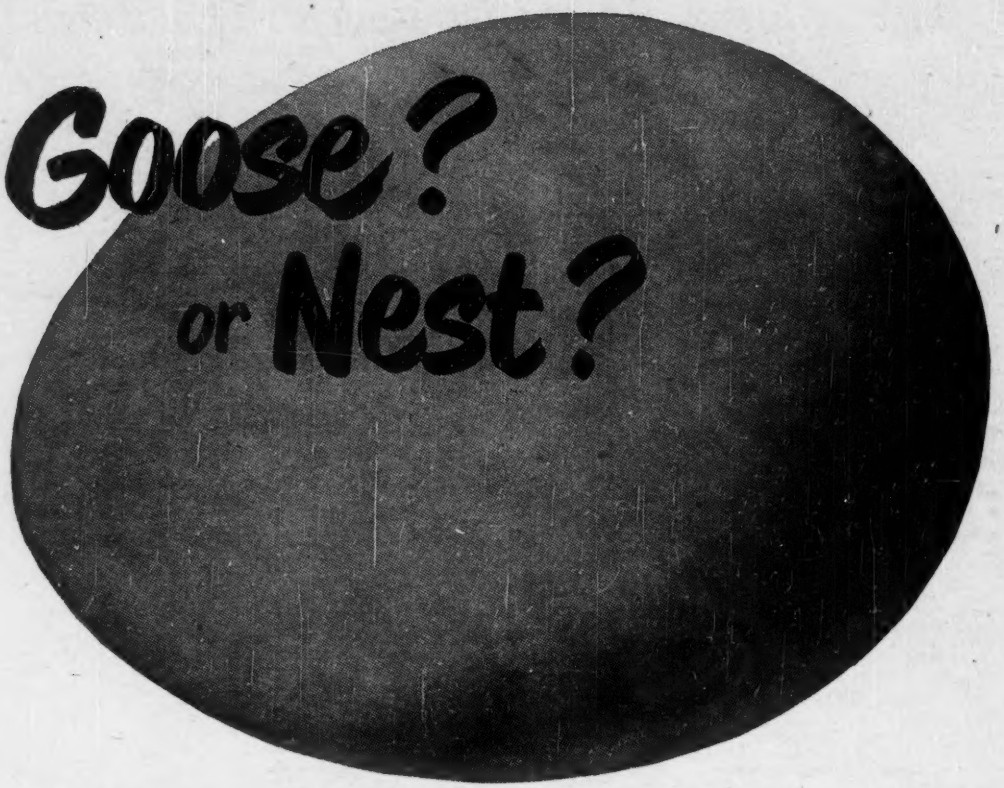

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